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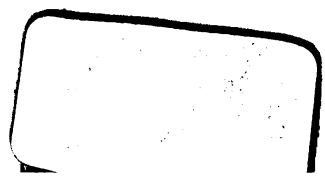

TRANSACTIONS

OF THE

AMERICAN PEDIATRIC SOCIETY,

SIXTH SESSION,

HELD AT

WASHINGTON, D. C.,

May 29th, 30th, 31st, and June 1st, 1894.

EDITED BY
DILLON BROWN, M. D.
NEW YORK.

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LIST OF PRESIDENTS.

1889. A. JACOBI, M.D.
1890. J. LEWIS SMITH, M.D.
1891. T. M. ROTCH, M.D.
1892. WILLIAM OSLER, M.D.
1893. A. D. BLACKADER, M.D.
1894. *JOHN M. KEATING, M.D.
1895. F. FORCHHEIMER, M.D.

*Died.

OFFICERS FOR THE YEAR 1894-95.

President.—F. FORCHHEIMER, M.D. . . Cincinnati, O.
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Second Vice-Prest.—AUGUST SEIBERT, M.D. New York, N. Y.
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THOMAS M. ROTCH, M.D. . Boston, Mass.
J. P. CROZER GRIFFITH, M.D. Philadelphia, Pa.
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MEMBERS—1894-95.

ACKER, GEORGE N., M.D. . 913 Sixteenth St., Washington
ADAMS, SAMUEL S., M.D. . 1632 K St., Washington
BAINES, ALLEN, M.D. . . . . Toronto, Ont.
BLACKADER, A. D., M.D. 236 Mountain St., Montreal, Can.
BOOKER, WILLIAM D., M.D. . 851 Park Ave., Baltimore
BROWN, DILLON, M.D. . 40 East 57th St., New York
BUCKINGHAM, E. M., M.D. . 52 Worcester Square, Boston
BUSEY, S. C., M.D. . . 1545 I St., Washington
CAILLÉ, AUGUSTUS, M.D. . 185 Second Ave., New York
CARR, WALTER LESTER, M.D. . 8 East 58th St., New York
CHAPIN, HENRY D., M.D. . 27 West 51st St., New York
CHRISTOPHER, W. S., M.D. . 408 Centre St., Chicago
CRANDALL, FLOYD M., M.D. 113 West 95th St, New York
DAVIS EDWARD P., M.D. . . 250 South 21st St., Philadelphia
DORNING, JOHN, M.D., . 252 West 25th St., New York
FORCHHEIMER, F. M.D. . . 160 West 9th St., Cincinnati
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HOLT, L. EMMETT, M.D. . 15 East 54th St., New York
HUBER, F., M.D. . . . 209 East 17th St., New York
JACKSON, HENRY, M.D., . . 309 Marlboro St., Boston
JACOBI, A., M.D. . . 110 West 34th St., New York
JENNINGS, CHARLES G., M.D. . 437 Jefferson Ave., Detroit
KOPLIK, HENRY, M.D. . . 175 East 70th St., New York
LAFLEUR, HENRY, M.D. 58 University St., Montreal, Can.
LOCKWOOD, WILLIAM F., M.D. 201 West Madison St., Baltimore
MACDONALD, A. A., M.D. . 180 Simcoe St., Toronto, Ont.
MORRILL, F. GORDON, M.D. . 181 Beacon St., Boston
NORTHRUP, WILLIAM P., M.D 57 East 79th St., New York
O'DWYER, JOSEPH, M.D. . 967 Lexington Ave., New York
OSLER, WILLIAM, M.D. . 1 West Franklin St., Baltimore
PACKARD, FREDERICK A., M.D. 110 South 18th St., Philadelphia
PUTNAM, CHARLES P., M.D., . 63 Marlboro St., Boston

RACHFORD, B. K., M.D.	117 Broadway, Cincinnati
ROTCH, T. M., M.D.	197 Commonwealth Ave., Boston
SCHARLAU, B., M.D.,	66 West 35th St., NEW York
SEIBERT, A., M.D.	137 East 19th St., New York
SMITH, J. LEWIS, M.D.	64 West 56th St., New York
SNOW, IRVING M., M.D.	476 Franklin St., Buffalo
STARR, LOUIS, M.D.	1922 Spruce St., Philadelphia
TOWNSEND, C. W., M.D.	61 Chestnut St., Boston
VAUGHAN, V. C., M.D.	15 South State St., Ann Arbor
WATSON, WILLIAM PERRY, M.D.	319 York St., Jersey City
WILSON, JAMES C., M.D.,	1437 Walnut St., Philadelphia
WINTERS, JOSEPH F., M.D.	36 West 32d St., New York
YALE, LEROY M., M.D.	432 Madison Ave., New York

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MINUTES OF THE ~~SIXTH~~ ANNUAL MEETING OF THE AMERICAN PEDIATRIC SOCIETY.

Held in Washington, May 29th to June 1, 1894.

FIRST SESSION.—Tuesday, May 29th.

The meeting was called to order in parlors "A & B," of the "Arlington," at 10-15, A.M. by Dr. F. Forchheimer, the first Vice-President. The Recorder, in the temporary absence of the Secretary, called the roll of membership.

MEMBERS PRESENT.

Drs. George N. Acker, S. S. Adams, and S. C. Busey, of Washington; W. D. Booker, of Baltimore; Dillon Brown, W. L. Carr, F. M. Crandall, of New York; W. S. Christopher, of Chicago; F. Forchheimer, of Cincinnati; J. H. Fruitnight, of New York; J. P. Crozer Griffith, of Philadelphia; L. E. Holt, A. Jacobi, H. Koplik, W. P. Northrup, of New York; B. K. Rachford, of Newport, Ky.; T. M. Rotch, of Boston; B. Scharlau, A. Seibert, of New York; Irving M. Snow, of Buffalo; Louis Starr, of Philadelphia; Wm. Perry Watson, of Jersey City; J. C. Wilson, of Philadelphia, and Joseph E. Winters, of New York, and several visiting physicians.

The minutes of the previous annual meeting, were on motion, approved as published in the Archives of Pediatrics, of July, 1893. Dr. Forchheimer then delivered a eulogy on Drs. John M. Keating and Charles Warrington Earle. Dr. Rotch also delivered a eulogy on Dr. T. F. Sherman.

Dr. Rachford then read a paper on "The Influence of Blood-Supply on the Irritability of the Spinal Motor Centers," which was discussed by Drs. Rotch, Christopher and Fruitnight.

Dr. Caille then read a paper on "Tonsillotomy, followed by Diphtheria and Croup," which was discussed by Drs. Jacobi, Koplik, Brown, Fruitnight and Rotch.

A paper on "Congenital Constipation," by Dr. Huber, was then read by the Recorder, and was discussed by Drs. Stowell, Jacobi, Fruitnight and Forchheimer.

Dr. J. C. Wilson then read a paper on "A Case of Malignant Measles," which was discussed by Drs. Rotch, Fruitnight, Stowell, Christopher, Forchheimer and Seibert.

On motion the Society adjourned at 1 P.M.

SECOND SESSION.—Wednesday, May 30th.

The meeting was called to order in the Directors' Room of the Children's Hospital, 10-15 A.M., by Dr. A. Caille, the second Vice-President, the subject for discussion being "The Etiology, Prevention and Treatment of Rickets," the first paper being read by Dr. Irving M. Snow, on the "Influence of Race, especially in Italians," and the second paper, by Dr. George N. Acker, on the "Influence of Race, especially in Negroes." Dr. Rotch also read a paper for Dr. C. W. Townsend on "A Case of Congenital Rickets." The general discussion was participated in by Drs. Caille, Griffith, Holt, Fruitnight, Seibert, Christopher, Adams, Koplik, Crandall, Winters, Stowell (visitor), Northrup, Carr, Acker, and Snow.

Dr. Seibert then read a paper on "An Aid to the Sterilization of Milk in Artificial Infant Feeding," which was discussed by Drs. Kiliani (visitor), Holt, Crandall, and Caille.

Dr. Fruitnight then read a paper on "Infantile Scurvy, especially its differential diagnosis," which was discussed by Drs. Northrup, Seibert, and Crandall.

On motion, a vote of thanks was extended to the Directors of the Childrens' Hospital, for their hospitality, after which the Society adjourned at 1 P.M. to be present at the opening of the Babies' Ward in the Hospital.

THIRD SESSION.—Thursday, May 31st.

The Society was called to order by the Vice-President at 10-30 A.M.

BUSINESS MEETING.

Dr. Holt submitted the report of the Council, as follows:

Time of Meeting.—May 20th to 30th, 1895.

Place of Meeting.—Hot Springs, Va.

Officers: President, F. Forchheimer, M.D., of Cincinnati, Ohio; First Vice-President, Louis Starr, M.D., of Philadelphia, Pa.; Second Vice-President, August Seibert, M.D., of New York City; Secretary, S. S. Adams, M.D., of Washington, D.C.; Treasurer, C. W. Townsend, M.D., of Boston, Mass.; Recorder, Dillon Brown, M.D., of New York City.

Member of Council: B. K. Rachford, M.D., of Cincinnati, O.

New Members: Allen Baines, M.D., of Toronto, Ont.; A. A. McDonald, M.D., of Toronto, Ont.; C. G. Jennings, M.D., of Detroit, Mich.; F. A. Packard, M.D., of Philadelphia, Pa., and E. P. Davis, M.D., of Philadelphia, Pa.

SCIENTIFIC SESSION.

Dr. W. S. Christopher, of Chicago, read a paper on "The Nutritional Element in the Causation of Neuroses," which was discussed by Dr. Rotch.

Dr. W. P. Northrup reported a "Case of Cyanosis," which was discussed by Drs. Rotch and Caillé.

Dr. T. M. Rotch, Chairman, read the report of the Committee on the "Nomenclature of Diseases of the Mouth." It was moved and seconded to adopt the report and the motion was carried, without discussion.

Dr. T. M. Rotch, Chairman, read the report of the Committee on the "Nomenclature of Diseases of the Gastro-Enteric Tract," which was discussed by Drs. Christopher, Caillé, Rotch, Seibert, Holt, Booker and Fruitnight.

Dr. Dillon Brown read a paper on the "Early Diagnosis of Potts's Disease of the Spine in Children," which was discussed by Drs. Rotch and Holt.

FOURTH SESSION.—Friday, June 1st.

The meeting was called to order by the President at 10-45 A.M.

Dr. Northrup read a paper on "Infantile Myxœdema."

Dr. Osler read a paper on "The Successful Treatment of a Case of Infantile Myxœdema with Thyroid Extract," which was discussed by Drs. Griffith, Carr, Rotch, Forchheimer, Northrup and Osler.

Dr. S. S. Adams' paper on "The Rapid Absorption of Carbonic Acid by an Eczematous Skin" was read by title.

Dr. L. E. Holt read a paper on "Acute Pyelitis in Infancy," which was discussed by Drs. Seibert, Osler, Caillé and Forchheimer.

Dr. C. W. Townsend's paper on "The Hæmorrhagic Disease of the New-Born" was read by title.

Dr. H. D. Chapin's paper on "The Symptoms of Intestinal Obstruction without Stenosis" was read by title.

Dr. William Osler's paper on "Two Cases of Acheudroplasia" was read by title.

Dr. J. Lewis Smith's paper on "Tetanus Neonatorum" was read by title.

Dr. Francis Huber's paper on "A Case of Giant Fingers (Casts)," was read by title.

Dr. W. S. Christopher read a paper on "Medical Septicæmia in Children," which was discussed by Drs. Caillé, Fruitnight, Holt, Adams, and Seibert.

Dr. George N. Acker gave an "Exhibition of a Mirror Writer."

On motion, the Society adjourned.

WILLIAM PERRY WATSON, M.D.,
Recorder.

EULOGY ON DRS. JOHN M. KEATING AND CHARLES WARRINGTON EARLE.

BY F. FORCHHEIMER, M.D.,
Cincinnati, O.

John M. Keating was born in Philadelphia (April 30, 1852), studied, first, at Seton Hall College, South Orange, N. J., graduated in medicine in 1873 (University of Pennsylvania) and subsequently at the Philadelphia Polytechnic College. In 1879, as physician to ex-Secre-

tary Borie, he accompanied General Grant on a tour around the world, and published, in 1880, an account of this trip ("With General Grant in the East").

His medical activity began in 1878, and from that time until his death (November 17, 1893) he was incessantly active as a teacher, as an author, as a physician. The great work of his life was done in pediatrics, from which, in a measure, he was forced by the condition of his health and his new surroundings, so that, during the last three or four years of his life his journal contributions were confined to climatology and gynæcology. Only forty-one years of age at the time of his death and having had his journalistic career limited to thirteen or fourteen years, it is wonderful how much he accomplished and how much he was able to do. This showed plainly the bright mind, and, secondly the well-trained mind and habit. During this time he wrote five books without any assistance and four others in conjunction with other physicians, including two dictionaries, one a pocket medical lexicon, and the other a "Voluminous and Exhaustive Handbook of Medical and Scientific Terminology, Etymology, etc." The first of these, a history of the yellow fever epidemic of 1878 in Memphis, Tenn., immediately showed what was to be expected from Keating, in that, in his thoroughness it embraced "a complete list of the dead, the names of the doctors and nurses employed, names of all who contributed means or money, and the names and history of the Howards, together with other data and lists of the dead elsewhere." From this principle of giving all that is known on a subject, Keating never swerved, and it is not saying too much to state that few have known how to handle medical material better than he did. Every one of his longer articles (Pertussis, Diseases of the Uterus, Vagina and Vulva in Children) bears testimony to this statement. Having been medical director of one of the large life insurance companies of this country, he published a book on "How to Examine for Life Insurance," which has gone through two editions. His clear style and lucid method of statement adapted themselves to popularizing, so that he has written one nursing health tract: "On Scarlet Fever and How to Nurse It," two small works, "The Mother's Guide in the Management and Feeding of Infants," and "Practical Lessons in Nursing, Maternity, Infancy and Childhood," and with Dr. E. P. Davis, "Mother and Child," all of which are models in their way; but especially the last which can be most highly recommended. With Dr. W. A. Edwards he wrote "Dis-

eases of the Heart and Circulation in Infancy and Adolescence," which was the most complete work of its time. In addition, he was co-editor of the "International Clinics" and "The Climatologists." For us, his great work was done in editing "Keating's Cyclopædia of the Diseases of Children." Whatever may be said of the inequalities and faults of the book, faults that will be found in any encyclopædia of any class, the great work was Keating's. Again his mastery in handling medical contributions came into play, and his executive ability. The publishing of this work opened the eyes of the profession to the fact that pediatrics was a field that was being cultivated in a special way in this country, and to this awakening, as much as to anything else, must be ascribed the phenomenal success of this book. With it, pediatrics received an impulse that has carried this branch of medical science to its present position and brought well-merited recognition to our pioneers, Jacobi and J. Lewis Smith, to whose names we now add that of Keating. In addition to all this literary work, I find titles of journal articles, clinical lectures, not including the article written for Pepper's large work and the "Cyclopædia of Children's Diseases."

He was lecturer on Diseases of Children at the University of Pennsylvania, and judging by his published clinical lectures he must have been an excellent teacher. All this was interrupted by the development of phthisis pulmonalis, when he was ordered to Colorado Springs and began to practice gynæcology, toward which he had a natural bent. It was my good fortune to have had considerable correspondence with Keating, first, in connection with the Cyclopædia, and then in connection with patients who were under our joint care. The most prominent characteristic of Keating was his fair-mindedness; he was always ready to give credit where it was due and was more than careful not to underestimate the services and opinions rendered by others. His friends speak of his beautiful character and personal amiability; his patients valued his services very highly and have related to me instances that showed him the true physician. On his way home from the East, he contracted a pneumonia which proved fatal. Suffering as he had been, feeling gloomy and more than doubtful regarding a favorable termination of his chronic lung trouble, he continued in his work when he was not too ill, and died, as it is the wish of all good physicians, in the harness, doing good to others, fulfilling the expectations of his friends and that sense of duty which, after all, is the

mainspring of the actions of a true physician. Young as he was, he has left his mark, his impression, upon the thought and actions of the medical world of his time; brilliant as he was, he never was meretricious; pediatrics has lost in him one of its ablest workers and as such his name will live and be honored.

Charles Warrington Earle died November 19, 1893, of meningitis, at the age of forty-eight years, after having lived a life of usefulness such as is rarely the lot of mortals to enjoy. Born in Westford, Vt., he came to Illinois when he was nine years old, his people settling upon a farm and the boy going through the ordinary routine of school life until the breaking out of the rebellion. The first call for volunteers was responded to by him; after six months of service he again returned to school remaining two terms, and then took up military service for three years. Before reaching his eighteenth birthday he was promoted to a second lieutenancy, commanding his company at Chickamauga and distinguishing himself by bravery so that a war correspondent spoke of him as "the lion-hearted boy-lieutenant." Shortly after this, he was captured and sent to Libby prison, from which he escaped by means of the famous tunnel, suffering from fatigue, cold and hunger, until, after a week's wandering, he was able to join the Union lines. He again joined his company, was promoted to first lieutenant, commanded a company during the Atlanta Campaign, was detailed on the staff of General Whittaker, and was finally breveted captain after having been repeatedly mentioned for heroic conduct in battle. At the close of the war he returned home, being but twenty years of age, entered Beloit College, from which he graduated, and then began the study of medicine in the Chicago Medical College, from which he graduated in 1870.

By the time he was twenty years of age he had lived as much as ordinary men do in a life-time; had distinguished himself, had overcome all obstacles, physical and otherwise, and having graduated from the army of war was beginning to prepare himself to enter that greater army of peace, whose soldiers are daily engaged in meeting enemies armed with the most deadly form of arms: disease.

Almost immediately after having graduated he accepted the chair of physiology in the Woman's Hospital College, taking diseases of children in 1875, so that Earle was probably the first, in this country, to have filled a full di-

dactic chair on diseases of children. At some time during the history of this college he was adjunct professor of "Practice of Medicine." Earle was one of the founders of the College of Physicians and Surgeons of Chicago, and with some intermission was, up to the time of his death, professor of obstetrics in that institution. Besides these two positions he was professor of obstetrics in the Post-Graduate School, and professor of diseases of children in the Chicago Training School for Nurses, holding, in addition, hospital appointments, both as consultant and as visiting physician. It will be seen from this long list, briefly narrated, that Dr. Earle's academic duties were many, but that he must have made himself thoroughly well fitted to have held these positions, otherwise they alone would have been sufficient to have consumed almost his whole time.

As an author we find forty-seven titles, not including his articles in Keating's or Starr's works, some of which were contributed at the meetings of this society—inclusive are several addresses and letters upon a variety of subjects, exhibiting a wide range of thought; a few of these titles are "Observations in Vienna: The General Hospital, Billroth, Carl Braun, Band land Others;" "The Cinchona Cure of Intemperance," "The Etiology and Treatment of Inebriety;" "Cirrhosis of the Pancreas; Pregnancy; Emaciation; Death;" "An Investigation to Determine Whether the Absence of Sewerage and Water Pollution Diminishes the Prevalence and Severity of Diphtheria;" "Summer Diseases of Children and Infant Diet," etc. A majority of these papers is on diseases of children. As an author, as well as a teacher, Earle was clear, concise and always to the point. It is but necessary to read one of his latest articles on typhoid fever in children (Starr) to see how thoroughly well he knew what he wanted to say and how well he could say it. His surroundings were such that he could not lay claim to the title of an original investigator, but all his articles contain food for thought and his medical development came very quickly, very surely, and was by no means narrow. He always had himself well in hand and, in discussion, knew his powers and his limitations, utilizing the one to their fullest possibilities and stopping before reaching the others.

Large of physique, endowed with a fine force and fine presence, his mental attributes and characteristics were molded in the same form. To quote from one of his friends (Dr. Wm. E. Quine, the Chicago Med. Society):

"Without the varnish of refined scientific attainment, he possessed, in addition to extensive and accurate knowledge, an enviable degree of solidity of judgment, an admirable and self-sacrificing devotion to every duty that was entrusted to him, and a generous soul that was quick to respond to every call of human sympathy. With honest heart he wept with those whose hearts were breaking and exulted with those whose hearts were bounding in joy."

At a meeting of the Chicago Pathological Society, another of his friends (Dr. Addison H. Foster) says: "In his general professional work he was heartily alive to all the interests of his profession and public duties. Endowed with an uncommon physique and endurance of continuous and arduous public and bedside labor, working night and day, in season and out, from the first moment of his professional career he never allowed himself one moment's rest or recreation, but crowded a life-time's work into a few short years."

According to the testimony of all his colleagues it seems to have been this uncommon physique and endurance of continuous and arduous public and bedside labor that was the cause of Earle's untimely death. We physicians are the last to accept that advice which we so frequently give to patients—to rest. One who has not known fatigue hardly recognizes its s, mptoms in himself, and in the struggle for existence, so sharp at this period of the world's history, a great physique may be of enormous value after the first attack has been made, but the temptation to abuse it is great, and nature is a strict taskmaster, creating what the older pathologists called a "locus minoris resistentiæ," which exists as surely to-day as ever, open to invasion of disease and, if in a vital spot, followed by fatal consequences. Earle died in the fulness of his powers, physical and mental, possibly in the fulness of his development; he has left behind him an enviable reputation, he succeeded in everything he undertook, he did his work nobly, his memory lives in his works, in his good deeds, in the lives he has saved, with his friends, his family and his profession.

INFANTILE SCURVY, ESPECIALLY ITS DIFFERENTIAL DIAGNOSIS.

BY J. HENRY FRUITNIGHT, A. M., M. D.,

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INFANTILE scurvy, though rather an uncommon disease, has, since the appearance of the writings of Barlow and others upon the subject, been more often correctly diagnosticated than formerly. Thus the impression may be produced that the affection is now more prevalent than it was once thought to be. Nevertheless as artificial methods of feeding have largely superseded natural breast suckling, and as scurvy is a disease distinctly resulting from the faulty nutrition depending upon such methods, it can be safely assumed that, to a certain extent, more cases of the disease are encountered now than when breast-feeding was more general. Even the much-lauded sterilized and pasteurized milk can, if it be not properly modified to meet the exigencies of each individual case, become the potent factor in such vicious nutrition, and evoke the clinical picture of a scorbutic attack. Pott,† of Halle, Germany, in a recent review of the literature of infantile scorbutus, observes that the disease is rare in Germany, not a single case having been met with among 22,000 infantile patients treated at the out-door clinic at Halle. It is certainly of much more frequent occurrence in this country, though no accurate statistics have, so far as I know, been thus far compiled here, and it is very possible that with our more exact knowledge of the disease at the present time, it is now also more frequently recognized in Germany than Pott's statistics would seem to imply was the case prior to 1892. My impression is that about seventy cases have thus far been reported in this country during the past six years.

The disease prevails chiefly among the children of

†Munchner Medicinishe Wochenschrift, Munich, Nov. 17 and Nov. 24, 1892.

well-to-do people, who have the means to purchase the various commercial artificial foods. These foods, the exponents of a vicious nutrition, cause in the great majority of cases the attack of the disease. The poorer classes, not having the means to buy these preparations, and too frequently allowing their offspring to have the "run of the table," as it is called, very seldom offer us cases of the disease, for the children in this way obtain sufficient anti-scorbutic diet to prevent its development. By some it has been maintained that the disease is due to some as yet undetermined organic infectious poison. Again a German observer has claimed that a specific micro-organism produces the malady. Dr. Babes'* latest experiments as regards the microbes to be found in scorbutic gingivitis were made in three typical cases of the disease. Microscopical and histological examinations were made of small portions of the tissues of the gums as well as of the blood. He found that the red blood corpuscles were decidedly decreased in number, with pronounced leucocytosis. He also observed a thin, long, wavy bacillus which was prone to form thick aggregations. These same clusters of bacilli were found so thickly gathered together in the tissues as to give him the impression of the existence of a pseudo-membrane. Other bacteria, especially the streptococci, were likewise detected. Inoculations of animals with cultures of these microbes caused death with lesions characteristic of scorbutus. These bacilli were also noticed in large numbers in the lungs and their capillaries, in the gums and in the various viscera. The petechiæ, however, were free from the bacilli. Babes is still pursuing his investigations. He is inclined to believe that the bacillus is one peculiar to the buccal cavity and that in consequence of a depreciation of the general health of the subject these microbes are roused to activity and thus succeed in producing the typical lesions of the disease. However, neither the theory of an infectious poison nor that of a specific bacterium have as yet been verified as etiological factors in this disease.

*New York Med. Record, May 19, 1894, p. 647.

The rational explanation of the development of the disease resides in the deficient alkalinity of the blood,—the direct result of a faulty nutrition—as evidenced by chemical investigations and the successful results of treatment with the fruit acids which, as is so well known, are converted by chemical changes in the body into the alkaline carbonates and bicarbonates. On the other hand, examinations of the blood by Dr. Frederick P. Henry, of Philadelphia,* in two well-marked cases of scurvy, contrary to what might be expected, revealed that the white blood corpuscles were not only relatively, but absolutely diminished in number.

As illustrative of the symptomatology of the affection, I will here report the clinical histories of six cases of the disease which I have observed, including one which I saw in consultation with Dr. Henry Ling Taylor, of New York City.

CASE I.—E. P., born in June, 1892. At birth she was very puny with small bones. For more than a year before the birth of this child the mother had been under treatment by Dr. A. L. Loomis and others for pulmonary tuberculosis, which disease, it was claimed, had been precipitated by prolonged lactation of a child born previous to this one. The mother had improved very much in health as the result of treatment and change of climate. The child, though frail, gave no evidences of phthisis. The physician who had attended the mother in her confinement, advised weaning of the infant at the end of its first month of life, lest the mother's health might again suffer, and to nourish it on one of the many artificial foods on the market. The child was kept at the breast for two weeks, and was then partly nursed and partly fed on one variety of artificial food. Soon she gave the child the artificial food only (Imperial Granum). The child did very badly; it did not thrive at all. A physician was consulted who recommended the use of sterilized milk. The child improved somewhat whilst partaking of this food. Though she seemed to feel bright and cheerful, she did not gain in flesh and weight. Something seemed to be lacking. She appeared to be hungry all the time. The use of the sterilized milk was continued until the child was six months old, when, as the child did not appear to

*Medical and Surgical Reporter, June 16, 1888.

thrive on it, this mode of feeding was discarded. Then the original artificial food was again given to the child, followed by Mellin's Food and, as the father expresses it, by "a whole lot of patent humbugs." In February, 1893, the mother observed that the child would shrink when put into her daily bath which she formerly enjoyed. The parents, who are intelligent people, examined the child carefully, but could discover nothing at first. In a few days the mother noticed that the child did not like to have the left ankle joint moved, and that it was slightly swollen. Her right arm also seemed occasionally to be held immovable. The soreness and swelling of the leg increased. At the same time the mother noticed that the gums were swollen and of a dark hue. The pain and swelling of the leg now became much worse. According to the mother's story, these symptoms constantly grew worse. In May the gums began to bleed when touched. In the meantime, possessed of the notion that the child had some joint disease, a physician had been consulted, who had diagnosticated acute articular rheumatism and had treated the case as such, but without improvement. The swollen and dark gums had been attributed to difficult dentition. When I saw the patient in May, 1893, she was in a deplorable condition. There was a large, tense, shiny, fusiform swelling at the ankle joint on the left side. A like condition existed at the lower end of the femur on the same side. Both tumefactions were exquisitely tender, and the child would cry out before she was touched if she noticed that a movement was made in the direction of her affected limb. Her temperature was 100°, pulse feeble and very rapid. Her gums were black or dusky purple, her tongue and cheeks were ulcerated. Unhealthy granulation tissue projected from the gums. The whole mouth was inflamed and swollen, accompanied by a fetid odor emanating therefrom. The slightest touch on the gums would cause free bleeding. Ecchymotic spots were liberally distributed over her back, abdomen and limbs, varying in size from that of a dime to half-dollar. The right eye was closed by an ecchymosis, the exact counterpart of what is vulgarly known as a black eye, the conjunctiva itself being involved in the effusion, which extended far down on the cheek and up to the eyebrows. She also passed considerable blood in her stools, but fortunately did not have diarrhœa. In consequence the child presented that cachectic or sallow anæmic condition always present in profoundly altered blood states. This,

therefore, was a typical and classical case of infantile scurvy. The prognosis was not very encouraging. But after systematic treatment carried on for a period of seven weeks, the child ultimately recovered, and enjoys perfect health to-day. The treatment was as follows: First the food was changed. Pasteurized milk according to Dr. Freeman's method was ordered, and the milk then modified to the percentage of cream and sugar suited to this particular case. Orange juice, in ʒi doses, every two or three hours, was administered. For the anæmic and enfeebled state of the child's system gr. j½ of the citrate of iron and ammonia was given every four hours. The milk, of course, was fed at regular intervals. An antiseptic and astringent mouth wash containing thymol, chlorate of potash and tincture of belladonna was also prescribed. In her recovery it was observed that she first improved in her legs, moving them about without pain. Then her mouth and gums healed and the hæmorrhagic spots were the last symptoms to disappear, they taking on the characteristic appearance of a contusion undergoing resolution and absorption.

CASE II.—Occurring in my practice was first seen by my associate, Dr. Bieser, and then by myself, gave the following history.

Mary D., aged fifteen months, rickety and still at the breast. The child gave a clean history of rickets, viz.:—delayed dentition, the child showing only the two upper central incisors at the fifteenth month, a disinclination to walk, perspiration at back of head, a pot belly, constipation and flatulence. With this previous history, the patient was first seen on Aug. 27, 1893. The child's temperature was 103°. It emitted cries of pain. Upon examination, both thighs just above the knees were found to be markedly swollen and very tender to the touch. Both limbs were extended and held immovable; indeed any attempt to flex or handle the limbs only elicited cries of distress. Posteriorly at the lower part of the right thigh and just above the knee-joint a suppurating hæmatoma was found, which undoubtedly had its origin in the subperiosteal effusion of blood above the knee-joint. Below the knee-joint the leg was the seat of an extensive erysipelatous looking lymphangitis. The abscess burst next day, discharging what the mother said was pure blood, but which evidently was nothing more than sanious pus. The hæmatoma originating in a scorbutic subperiosteal effusion, evidently became infected

in some manner, suppurated and caused a secondary lymphangitis.

The gums were spongy, dark-red like a beet, with ecchymotic points upon their summits. From these symptoms and from the fact that anti-scorbutic treatment relieved and cured the child in a remarkably short space of time, the diagnosis of infantile scurvy was made. Treatment: the child was taken from the breast and given good cow's milk, first diluted one-third with oatmeal water; orange juice, lemon juice, twenty drops every two hours, and apple pulp scraped were given to the child, all of which it took with avidity and craved. Medication was as follows: Citrate of potash was given t. i. d. in gr. v doses, and citrate of iron and quinine gr. $1\frac{1}{2}$, with dilute nitro-muriatic acid three times daily. After three days of this treatment the child stopped crying, the fever had disappeared, the limbs could be moved and handled without pain, and the swellings had subsided although the shafts of the bones remained thickened for some time longer. The lymphangitis under applications of diluted liquor plumbi acetatis subsided in twenty-four hours after rupture of the abscess.

CASE III.—H. K., aged eighteen months. Had been fed on various artificial infant foods since her twelfth month. She rapidly deteriorated under their use. When she came under my observation she presented the following symptoms:

White, tense, brawny swelling of right ankle-joint extending along the gastrocnemius muscle and very tender to pressure. She holds the limb rigid and cries when attempts are made to move the limb. The swelling is elongated. The gums are swollen, sore to the touch, and bleed, having a purplish tint. Ulcers are discovered on cheeks. Her breath is very offensive, tainting the atmosphere of a large room. Small ecchymoses, few in number, however, are present on various parts of the trunk. Treatment instituted as follows: modified sterilized milk as her diet, orange juice and apple pulp scraped in considerable quantity during the day, and one and one-half grains of citrate of iron and ammonia three times daily. A simple antiseptic and astringent mouth-wash containing eucalyptus, chlorate of potash and tincture of belladonna was prescribed to correct the fetor of the mouth. Within ten days all the symptoms enumerated had disappeared under this treatment, the patient being entirely free from pain and swellings in the limb.

CASE IV.—H. G., aged eighteen months, rickety, has incurvated tibiæ, enlarged epiphyses at wrists, tumid abdomen, anterior fontanelle still widely open and other symptoms of rachitis. Has fusiform swellings at lower end of femur and at ankle-joint on right side, which are very sensitive to the touch. Cries when moved, holds this limb in a fixed posture. Gums are swollen, spongy, and bleed when pressed upon, and also exhibit small ecchymotic spots. No ecchymosis to be discovered anywhere on the body. Had been breast-fed up to within three months previous, when he was fed with an artificial commercial food. He was at once put on modified Pasteurized milk, orange juice, scraped apple pulp, and a little scraped raw beef, with citrate of iron aud quinine, gr. $1^1/_2$ t. i. d. He soon began to mend and within a fortnight he was practically well.

This case would formerly have been designated one of acute rickets as Case II also would have been, but we know that they really were cases of infantile scorbutus superadded to a pre-existing rachitis.

CASE V.—E. O., aged two and one-half years, when first seen was very pallid, temperature 102°. At the lower extremities of both femora were detected swellings, fusiform in shape extending up the thigh some distance. The skin was tense, boardlike and shiny and very white. No redness or puffiness remarked in the swellings, and they were so sensitive that the child would shrink away and cry when an attempt was made to handle her legs. She was inclined to lie very quiet and motionless. The gums were only highly congested, no ecchymoses anywhere. The therapeutic test successfully applied in conjunction with the symptoms referred to the extremities, justifies the diagnosis of scurvy. The child's diet had consisted mainly of a prepared food for a long time. Within a week after the appearance of the symptoms she had entirely recovered and was able to run about the house. The family who are very careful of the health of its members had called me in at the very inception of the symptons and therefore treatment had been instituted sufficiently early to hinder the development of the other symptoms of scurvy. The treatment was orange juice ad libitum, apple pulp scraped, and citrate of iron and ammonia, two grains t. i. d. In three days after the treatment had been begun the pain in the extremities had disappeared and the child allowed free handling of extremities. This rapid amelioration of the symptoms

and speedy recovery shows how tractable the disease is when the case comes under observation in its earliest stage before blood changes have ensued.

CASE VI.—was seen by me in consultation with Dr. Henry Ling Taylor and was reported by him in the *American Medico-Surgical Bulletin* for February 1, 1894. It is as follows in his own words.

"A little girl, eleven and a half months of age, was brought to me last August from a southern city for treatment. The baby had been ill about four months with a disorder so peculiar that it had been variously taken for Potts's disease of the spine, disease of the hip-joint, and rheumatism, by some of the physicians who had seen her, while others confessed that they were unable to make a diagnosis. The child had grown steadily worse in spite of careful treatment, and though a beneficial effect from a change of climate had been hoped for, she had lost ground so rapidly after coming North, over a week before her visit, that her condition had become critical. Examination, on August 28, showed a poorly nourished but not excessively emaciated body, with a skin of dusky or swarthy hue, covered with a papular eruption. The temperature in the rectum was $102\frac{1}{2}$ at noon. The child could not sit up, and lay with a bent back in a partially doubled-up attitude. The facial expression was drawn and apprehensive, but intelligent, and any attempt to handle her or even to approach her was resented with loud outcries. The child evidently suffered great general discomfort, which became acute pain if she was touched or moved. In crying, she exposed a set of purplish swollen gums, ulcerating around the bases of the teeth, of which she had the eight incisors. The upper gums were the most affected, and an offensive discharge came from the ulcerating surfaces.

Examination of the spine showed a slight but distinct projection at the first and second lumbar vertebræ, and abnormal rigidity. The arms and hands were moved freely and naturally; the legs, however, seemed to be nearly powerless. On the left side, the toes and ankle could be moved voluntarily, on the right side only the toes very slightly; with these exceptions the lower limbs were never moved, even in the frantic efforts of the child to resent examination; the knee reflexes were normal. There was a tender swelling of moderate size above the right ankle, which had appeared about two weeks before, and had been considered to be rheumatic. The mother

stated that the child had always been nourished on a particular brand of condensed milk, diluted according to the printed directions, which appeared to agree with her, as she had been free from stomach and bowel trouble. It was afterwards admitted that the movements had lately been stringy in character. The baby had, however, been nursing less and less, partly from weakness and illness, and partly from soreness of the gums, until, for a day or two previous, she had almost entirely ceased to take the bottle. She was restless and sleepless at night, and when she did fall to sleep would frequently wake up suddenly and cry out as if in pain. She sweated a great deal, especially about the head. None of the usual signs of rickets were observed. The baby had appeared to be very well and hearty up to about seven months of age. At six months of age she had rosy cheeks, weighed twenty-five pounds and would sit up and play without support. The first thing that was noticed amiss was weakness in sitting up. It was observed about the same time that she did not move her legs freely, and that her attitude was peculiar ; she seemed to double up in sitting and lying, and it would hurt her to be moved. About a month later the gums began to be swollen and sore, which was attributed to a bruise ; they have, since then, bled at times. About the time that the gums became sore, a heat rash appeared all over the body, which has remained ever since. Soon after the baby was taken sick, a swelling was noticed on the right thigh, but after awhile it disappeared. About a month before coming, a considerable swelling appeared about one eye, which passed off after a week or two. The swelling above the right ankle, supposed to be due to rheumatism, had been followed by a discoloration of the skin above the ankle ; there had also been at times some small purplish spots on the arms. From the time she began to grow weak, up to the time of examination, she had, on the whole grown steadily worse, and for several months had moved the legs scarcely at all, and had complained more and more on being handled. Several of the symptoms enumerated were suggestive of Potts's disease, but the sore gums, and the tender swelling near the ankle arrested my attention and aroused the suspicion of scurvy, and the diagnosis was made positive the same day by my friend, Dr. J. Henry Fruitnight, whom I called in council.

Dr. Fruitnight suggested that the baby be fed on Pasteurized milk, and put on small doses of lime-juce, and citrate of iron and quinine. As I was desirous of

noting the effect of a simple change of diet, without medication, the baby was, the next day, put on Pasteurized milk, 4 oz. milk–2 oz. water, every three hours, and no drugs were exhibited. I ordered, however, the juice of one orange, daily, given in small amounts at a time and also a teaspoonful, twice a day, of raw beef-juice. The mother was directed to let the child lie on the cot, and on no account to move her except to sponge the body and change the napkins. I know of no better word than "magical" to describe the effect of these simple measures.

The orange-juice was taken from the start with ravenous eagerness, and the meat-juice scarcely less greedily. From barely tasting the milk, the quanity taken increased with each feeding, until after twenty-four hours she eagerly took from four to six ounces. The rectal temperature dropped about a degree and a half a day, and was 98° on the fourth day, and practically normal thereafter. The first night after the change of diet, she slept soundly all night, awaking only once, something she had not done for six months. The next day the general tenderness was less marked and the baby was seen to extend the left knee and arch her back ; two days later, she voluntarily pushed the right leg down. She had ceased to cry and fret, and lay quietly on her cot, apparently free from suffering ; the gums were half their former size, and had lost their congested look. On Sept. 2, it was noted that the eruption was rapidly disappearing ; it was followed by a fine desquamation. On Sept. 3, as the milk failed to satisfy her, the strength of the mixture was increased to three parts milk and one part water. She continued to make rapid progress, and on Sept. 8, I was obliged to increase the strength of the milk to five to one, on account of her ravenous appetite. On Sept. 9 it was noticed that she moved both legs quite freely ; for four days she had been able to lift the left leg clear of the bed, and the right for one day. The spine was flexible, and a tracing showed that the projection was practically gone. As the spinal and pseudoparalytic symptoms had all cleared up on an anti-scorbutic diet, it was evident that no Potts's disease had existed. On Sept. 11, the quantity at each feeding was increased to six ounces of milk with two ounces of water, and on the 13th to seven ounces of milk and one of water, every three hours, which was barely sufficient to satisfy her. She was soon after allowed to sit up and to be taken out, and went home fully restored in all respects, in less than four

weeks from the time of the first examination. When last heard from, a short timea go, she continued in good health."

CASE VII.—It may not be amiss in this connection to report the case of a boy, nine years old, who suffered from the disease. He had for a very long time subsisted on a diet made up chiefly of salted meats, as ham, bacon, shoulder,dry rye bread and black coffee.

When seen by me he had complained greatly of pains near the knee joints which his mother called "growing pains." There were oval swellings about both knee joints; they were very sensitive to pressure and the boy made no attempts to walk, retaining the same position constantly on his chair except when he would lie down for a change. His gums were very spongy and sore and swollen and bled very easily. He showed many minute ecchymotic points. His teeth were loosened and covered with much tartar; several ecchymoses were formed on legs and breast. His breath was very foul. He had alternate constipation and diarrhœa. They also had a craving for some things. He was very pale. He was put on an anti-scorbutic regimen, as potatoes, oranges, lemonade, vegetables of various kinds, beef and mutton together with five grains of citrate of iron and quinine combined with dilute nitro-muriatic acid three times daily. Within ten or twelve days he was practically well.

The symptoms therefore of the disease are these: The disease seems to have a predilection for the lower extremity, usually in the region of the knee and ankle joints, which become preternaturally immobile simulating in a manner a pseudo-paralysis of the affected limb. This is accompanied by exquisite tenderness when touched and also by a considerable amount of tumefaction. This swelling is usually fusiform or longitudinal; this cylindrical swelling of the lower ends of the femur and tibia are the most characteristic bone symptoms, sometimes the radius may be similarly affected. The skin over the swellings is always tense, shiny, pale, and without local heat. Nor does the swelling pit on pressure as is the case in œdema or superficial tumefaction. This is the character of the swelling because it is produced by the deep thickening of the shaft of the

bone. In this condition of the bone there is great liability to fracture near the epiphysis. The gums may be affected, ranging from swelling and sponginess to slight ecchymoses. Fever may be present or absent. In cases which have persisted for a long period profound anæmia will supervene. Hemorrhages under the skin and collections of blood in the tissues are met with in cases which have remained untreated for a considerable time after the first irruption of the disease forming spots of ecchymoses or petechiæ. The skin covering these extravasations of blood sometimes inflames and suppurates, giving vent to grumous blood leaving behind an ulcerating cavity. Epistaxis enterrhagia and bleeding from various mucous membranes may take place. Hæmaturia has also been observed in cases of scurvy in children. It is noteworthy that these hemorrhages are very apt to occur at points where epiphyseal growth is most active.

Hemorrhage beneath the orbital periosteum may produce proptosis and swelling about the eye. Diarrhœa is present in some cases. Albuminuria is sometimes encountered in the course of the disease.

Post-mortem examinations have demonstrated that a more or less perfect cast of the blood clot is deposited between the uplifted periosteum and the bone. This clot may occasionally extend along the greater portion of the periosteum of the shaft of the bone. These subperiosteal hemorrhages are said to be more prevalent among children than adults.* Effusions of blood have also been found beneath the periosteum of the skull, thorax, pelvis and ribs. Whilst the superimposed periosteum becomes thickened, the underlying bone atrophies and becoming brittle promotes the liability to fracture or epiphyseal separation on slight provocation. If such an accident happens, repair of the injury is very uncertain. The loose and macerated condition of the deeper periosteal layers very probably induces the swelling and tenderness and conduces to the occurrence of hemorrhages in

* Rogers in Boston Med. and Surg. Journal, 1892, p. 818.

infants. This same condition very probably explains why the patient exhibits the signs of a pseudo-paralysis. Visceral hemorrhages, particularly into the pleura, lung, intestinal canal and spleen have been described as occuring in the course of scurvy, and one writer claims that hemorrhagic pleurisy is more indicative of scorbutus than of tuberculosis.

The condition of malnutrition present in scorbutus must exert a special influence upon the vascular system, for the hemorrhages could not happen unless a diseased condition of the blood vessels prevailed.

Formerly before scorbutus was differentiated as a distinct nosological entity it was most frequently designated as acute rickets. We often do meet with cases of rachitis which have engrafted on them an attack of scurvy as in two of the cases reported in this paper. Doubtless like other conditions of malnutrition, rickets would be apt to render its subject much more liable to an attack of scurvy if an improper diet were indulged in. Still most of the reported cases of scurvy have been free from rickets. Though rachitis is a disease resulting from malnutrition yet it will not merge into scorbutus unless the blood lack that one element which is supplied by an antiscorbutic regimen.

The proposition made by Dr. Wm. Koch that all hæmorrhagic diseases should be considered as scurvy is altogether too broad and sweeping, for many of the affections having hæmorrhagic petechiæ as a symptom, do not exhibit the pathological lesions of a scorbutus and must be considered as separate disease processes.* It has been urged that scurvy never occurs in breast-fed infants. This is an error, for if as in one of my cases, lactation be too prolonged, the natural and progressive chemical changes in the mother's milk coincident with its aging, may, by virtue of this alteration in the ratio of its various constituents, conduce to the development of a scorbutic attack. The triad of symptoms upon which the diagnosis of scurvy may be safely predicated are: first, the swellings

*Rogers loc. cit.

and tenderness of the epiphyseal ends of the femur and tibia, secondly, the sponginess swelling and bleeding of the gums, and, thirdly, the rapid and complete cure under the administration of antiscorbutic treatment. These are at times reinforced by the presence of ecchymoses or petechiæ or hæmorrhages from the mucous membranes. Sometimes one of these symptoms is so faint that it is very difficult to make a diagnosis upon them alone, when the therapeutic test solely must decide the question. The disease with which scurvy is most generally confounded is acute rheumatism, because of the prominence of the joint symptoms in the former disease. If the patient be carefully examined in the light of our present knowledge upon the subject such mistakes will be avoided. Before elucidation of the subject in common with you all I doubtless diagnosticated some cases of scurvy as rheumatism. First the character of the swellings differ in rheumatism, they are more apt to be lateral or circumferential, whereas in scurvy as already so often stated the swellings are longitudinal, cylindrical or fusiform. Secondly, in scurvy there is not apt to be a *local* elevation of temperature, whereas the reverse is always the fact in acute rheumatism. Furthermore the joints are red and puffy in rheumatism, whilst in scurvy the swelling is white, tense not puffy nor boggy but board-like and brawny. In rheumatism the tenderness is localized to certain points when pressure is made but in scurvy the sensitiveness is more diffused. So much for the joint symptoms which if unaccompanied by other symptoms are most apt to be misinterpreted. If in addition to these joint symptoms we have present the symptoms referrable to the mouth, the less likely will a mistake in diagnosis be committed. And, if besides, the ecchymoses have appeared all the more positive will be our diagnosis of scurvy. If the joint symptoms only be present and not well marked at that, then the therapeutic test will determine the point by the production of a rapid improvement in the scorbutic symptoms under the appropriate antiscorbutic remedies. If rheumatic purpura be present and thus add confusion to the

case the same therapeutic procedure will clear up the diagnosis. It has been objected by some, that by thus waiting to make the diagnosis upon the effect of therapeusis, should the case be actually one of acute rheumatism, we expose the patient to the possibility of an endocarditis or valvular lesion by neglecting to institute the proper treatment for a rheumatic attack preventive of such catastrophes. To this it may be replied, that if the symptoms do not very promptly abate under the antiscorbutic treatment, it must be assumed that the case is rheumatic and a new line of treatment can be begun before sufficient time shall have elapsed to allow of the development of cardiac complications, for it is very exceptional for a cardiac lesion to develop so very early in the course a rheumatic attack.

What is usually called "growing pains" by the laity is in most cases a subacute rheumatism or arthritis and should therefore be differentiated from scorbutus. Joint diseases of an inflammatory character and Pott's disease of the spine may be diagnosticated when the illness is really scurvy. If a slightly bowed and stiff spine, accompanied by peevishness, nocturnal restlessness and crying and an aversion to being handled are added, spongy gums and tender swollen lower extremities, antiscorbutic treatment should be ordered, when in a few days this therapeutic test will determine the differential diagnosis. Besides in very many of these cases we can obtain a history of traumatism producing the joint or spinal lesion, a factor not at all operative in cases of scorbutus.

It is also important to differentiate the pseudo-paralysis observed in cases of infantile scurvy from other infantile parétic conditions. This pseudo-paralysis can only appear in consequence of the previous development of the scorbutic bone lesions, which must be looked for, and their presence will therefore clinch the diagnosis of infantile scurvy. We have already treated of acute rickets; from long continued rachitis it can very easily be distinguished, for if the scorbutus were of long standing the classical tripod of symptoms already referred to would certainly be present rendering its diagnosis most positive.

There should not be any hesitancy in distinguishing between the various affections characterized by lesions of the mouth, as ulcerative stomatitis, gingivitis, glossitis, dentition, noma, and so on, and scurvy; for aside from the differences in the clinical aspects and behavior of such lesions as compared with those met with in scurvy, it must never be forgotten that the bone and joint symptoms of scorbutus must always precede the appearance of the mouth symptoms and these latter should therefore be searched for in uncertain cases. The co-existence of these two groups of symptoms will render the diagnosis of scurvy more than probable. As ecchymoses or petechiæ are a pronounced symptom in advanced cases of scurvy, I will take the liberty to introduce here a classified and systematized table * of the diseases and conditions which may be accompanied by such purpuric spots.

CAUSES OF PURPURA.

A. *Vascular.*

1 Specific Blood Diseases (Syphilis, Anthrax, Cerebro-Spinal Meningitis, Yellow Fever, Small Pox, Malaria, Measles, Scarlet Fever, Relapsing Fever, Typhus, Typhoid, Septicemia and Pyemia.)
2 Anemia.
3 Leucocythemia.
4 Jaundice.
5 Hodgkin's Disease.
6 Scurvy.
7 Acute Fatty Degeneration of New Born.
8 Winckel's Disease.
9 Purpura Hæmorrhagica Simplex (Morb. Maculosis or Werlhofii Hemophilia).
10 Purpura Rheumatica.
11 Peliosis rheumatic not essentially rheumatica but with joint pains.
12 Peliosis Tuberculosa.
13 Acute Dysentery.
14 Hæmidrosis.
15 Inflammation.
16 Certain Digestive Disturbances causing Plethora.

B. *Toxic.*

1 Serpent Venom.
2 Phosphorus.
3 Mercury.
4 Mineral Acids.
5 Salicylic Acid.
6 Quinine.
7 Iodine and Iodides.
8 Chloral.
9 After Vaccination.

C. *Mechanical.*

1 Cardiac Diseases.
2 Hepatic Diseases.

* Compiled by my associate, Dr. A. E. Bieser.

3 Nephritic Diseases,
4 Feeble Circulation.
5 Varicose Veins.
6 Thrombosis of Venous Trunks.
7 Paroxysms of Coughing (Pertussis).
8 Senile Purpura.
9 Cephalhæmatoma.
10 Black Eyes from Fall on Occiput and etc.

D. *Neurotic.*

1 Tabetic Purpura.
2 Neuralgic Purpura.
3 Purpura Urticaria.
4 Erythema Nodosum.
5 Hæmorrhagic Herpes.
6 Hysterical Stigmata.
7 Hypnotic Stigmata.
8 Vicarious Menstruation.
9 Othœmatoma of Insane.
10 Purpura following extirpation of Sympathetic Garglia.
11 Purpura accompanying other diseases of the Nervous Centers.

Among the numerous forms of purpura it seems to me that there are but two varieties, which might present a little difficulty in discriminating them from the petechiæ of scorbutus. This obstacle can be readily surmounted, if in connection with the purpuric spots we pay particular attention to the clinical development of the case. In the *peliosis rheumatica* in which the purpura are accompanied by pain, but not rheumatic, the absence of the characteristic bone and joint lesions which ought to precede the appearance of the petechiæ will suffice to settle the question of diagnosis. As pain is a prominent symptom in this variety of purpura, it is the one most likely to be mistaken for the purpura of scurvy. From purpura hæmorrhagica simplex, sometimes termed morbus maculosis, or morbus Werlhofii, which was once considered identical with the disease of which we are treating, scurvy can very readily be discriminated from the fact, that no pains about the joints are present in the first named affection. All the remaining purpuric affections can be dismissed from our consideration because the clinical history of the conditions which cause them must necessarily suggest the

proper diagnosis of the disease of which they may variously happen to be a symptom.

If the disease be recognized, even if considerably advanced, and the proper treatment be applied, recovery will always ensue. Nor is the prognosis absolutely unfavorable in those cases which have gone on for a long time before treatment is begun, and in which the lesions are severe and pronounced, as witness the first case reported in this paper. It will not be considered too sanguine that now when the diagnosis of scurvy can be made so easy and positive, to declare that in the future the prognosis must always be favorable and that consequently the opportunities for post-mortem investigations in this disease will have passed away.

The chief element in treatment consists in regulating the diet suitable to individual cases of the disease. All artificial foods must be rigidly interdicted. The food should comprise good fresh cow's milk sterilized, or preferably Pasteurized, and *modified* to meet the case in hand. If the child be old enough, some fresh scraped beef is permissible, also some baked or mashed potato passed through a sieve. The different fruit juices, particularly orange, then lemon, lime and apple, should be added to this. These substances may be considered as partly dietetic and partly medicinal in character, as they act chemically on the fluids of the economy. Medication pure and simple is never required in mild or early recognized cases of infantile scurvy. Adherence to an antiscorbutic regimen will suffice to effect a cure in these. Medicinal agents are only needed to combat and overcome the concomitant evils of the scorbutus. The most prominent exponent of the cachectic changes in the blood following in the train of scorbutus is a profound anæmia. In the treatment of this condition, iron is indicated and it gives the best results. If at the same time the heart be of feeble tension and need a stimulus, I select the double salt of citrate of iron and ammonia to be given in doses varying from one to five grains according to the patient's age, three or four times daily in water. When there is

anorexia and some fever is present, I prefer the citrate of iron and quinine in like doses, which, if the tongue be dry and fissured is combined with small doses of dilute nitro-muriatic acid and administered in a menstruum of syrup of orange peel and water. If the child be old enough, cod liver oil may be administered. For the hæmorrhages, particularly for those in the mucous surfaces, ergot in suitable doses should be given. The mouth needs attention, and should be kept scrupulously clean. Astringent and antiseptic lotions are in order. Among the best are such as contain thymol, eucolyptol, carbolic acid, salicylic acid, or boracic acid combined with chlorate of potash, which last seems to have a specific effect on morbid states of the buccal cavity. If there be excessive salivary secretion, some tincture of belladonna or myrrh may be added to these mouth washes. Painting with a solution of nitrate of silver has also been advised. The petechiæ do not need any special treatment. If, however, they should show a disposition to break down and suppurate, this process should be encouraged by the usual methods, and as soon as practicable incision should be made to liberate the detritus. For relief of the pain of the swollen epiphyses soothing and evaporating lotions as the well-known lead and opium wash will be useful and grateful to the patient. If the pains be excessive, it will be permissible to administer opiates or other anodynes internally. Fixation of the extremities is also to be recommended by the use of proper appliances. A separation of the epiphyses will necessitate putting the limb in splints, plaster of Paris being preferable. The condition of the bowels may need attention. Fresh air and free ventilation are very important in the treatment. Only in the very far advanced cases are alcoholic stimulants indicated, and then they must be given very cautiously, much diluted, and at not too frequent intervals.

Our knowledge of the disease can be briefly summarized as follows, viz.:

1. It is the result of a faulty nutrition which leads to a deviation from the normal chemical composition of the blood, probably a deficiency of its alkalinity.

2. The disease is characterized by a blood dyscrasia accompanied by structural changes in the coats of the blood vessels.

3. The bone and joint lesions, the spongy condition of the gums and the petechiæ constitute a triad of symptoms highly pathognomonic of the disease. One or both of the two last-named symptoms may be lacking.

4. The order of development of the symptoms seems to be: first appear the tenderness and swellings of the lower extremity, then the sponginess of the gums, and finally the hemorrhagic extravasations.

5. Under the treatment these symptoms begin to improve in the same order of sequence, the epiphyseal lesions disappearing more rapidly than the other two.

6. If there be any doubt of the diagnosis of a given case, recourse should be had to the therapeutic test of an anti scorbutic regimen, which will, by its results, in a comparatively short space of time determine the question beyond cavil.

7. The prognosis is nearly uniformly favorable under proper treatment, and the likelihood is that as physicians become more familiar with and competent in diagnosticating the disease, its mortality will be reduced to *nil.*

8. The main principle involved in the treatment of infantile scurvy is comprised in the institution of anti-scorbutic dietetic measures.

DISCUSSION.

Dr. Seibert said that he would insist on first treating the patient for rheumatism, and then for scurvy, instead of, as Dr. Fruitnight had said, for scurvy first, and then for rheumatism. He thought the danger of the heart lesion in rheumatism was much more important. He had seen many sick children among poor people, and although he had looked for scurvy he had seen only two cases in four years. He had, however, seen many cases of hæmorrhagic purpura, and sore gums. Possibly, one reason why scurvy was more frequent in this country than in Germany was that the children in Germany were not allowed to eat candy. The cause of scurvy, in his opinion, was not absolutely malnutrition. There was nos cientific basis for any such assumption. It was purely and simply

an infectious disease, like any other hæmorrhagic disease. If scurvy were due to malnutrition alone, as rickets was, it would be a disease of the whole body, which it was not. The purpura and the hæmorrhages were confined to certain places, and the blood vessels of the whole body were not diseased. He thought there was no question as to its being a constitutional infection. He was positive that many cases of so-called scurvy were sore gums with perhaps a rheumatic purpura. He certainly had not been able to make the diagnosis of scorbutus, pure and simple, more than twice in two years.

Dr. Crandall said that the paper was excellent, and very thorough in its discussion of the differential diagnosis; yet it seemed to him that the order of development of the symptoms had been stated rather positively. He did not believe these symptoms developed in any definite order, or that they disappeared in any regular order. Sometimes the mouth symptoms were the first to disappear; sometimes the leg symptoms; and the order of development also varied. He would be inclined to say that pain on motion was about the first symptom observed.

THE FILTRATION OF MILK:

AN AID TO ITS STERILIZATION.

By A. SEIBERT, M.D.,

Professor of Pediatrics, New York Polyclinic.

By making use of the centrifugal machine, we may precipitate more or less filth, consisting of manure, cow's hair and dust from milk. This plan of removing the gross impurities has been in operation in large establishments for condensing milk, but for family use is out of the question. This want has been the most important drawback to the proper sterilization of milk during the hot summer months, as in very filthy milk the number of germs is too great to allow a sufficient grade of sterilization, even on boiling for one hour. It is now a well-recognized fact that a small quantity of bacteria in a given bulk of milk can be destroyed much quicker than a larger quantity.

Now, if any one thing varies from day to day, then it is the amount of dirt found in milk, and so also the number of bacteria in a given quantity. In our methods of ster-

ilizing milk, so far no practical cognizance was taken of this fact, in as much as from day to day we have sterilized the same length of time.

With these points in view I to-day desire to call your attention to a method of cleaning milk before sterilization which I devised during the last year, which not alone enables everyone to remove the gross filth from the milk, but which also diminishes the number of bacteria contained therein to a remarkable extent.

While staying in Hamburg and Berlin in September of 1892, during the epidemic of Asiatic cholera, I naturally was much impressed by the value addicted to central sand filtration of the water supply in Berlin and Altona (a large suburb of Hamburg) and its absence in Hamburg. It was but natural that during the following winter I should experiment as to the feasibility of filtering water at home, as New York also has no filtered water. My success was so marked, that I next turned from water to milk, and here also, much against my expectations, I was able to register positive results. This filtration is done with an ordinary funnel and *absorbent cotton.* (It is to be understood here that I know very well that cotton has been used in laboratories for filtering purposes for years past.)

In the *first* line of experiments, I took four sterile test-tubes and filled two of these half full with filtered and the others with unfiltered water. The cotton used here was taken from the centre of a package, but was not sterilized. The funnel was irrigated by filtered water before using. The tubes were then closed with cotton plugs and left standing in a temperature between 60° and 70° F. After twenty-four hours the unfiltered water appeared hazy and had a faint odor, after forty-eight hours it appeared cloudy and the odor was intensely nauseating. The filtered water showed no change, even after four days. Numerous control-tests always gave the same result after forty-eight hours. Aside from this the color of the filtered water was much clearer than that of the unfiltered.

The *second* class of experiments consisted of culturing

and counting the bacteria in filtered and unfiltered water. In these tests cotton, funnel, graduated pipette and small bottles were carefully sterilized by one to two hours steaming in the Arnold cooker. Then $^1/_{100}$ cubic centimetre of filtered water was added to each of six sterile tubes half filled with peptonized meat bouillon gelatine (from the Carnegie laboratory), and the same quantity of unfiltered water was added to another equal number of tubes, at the same time. After liquifying the gelatine in the hot water bath, each tube was emptied into a sterile Petri plate and left standing in the room. After twenty-four to thirty-six hours the number of visible colonies were counted (according to Langermann's method). In the *unfiltered* water the number of bacteria varied between 9,000 and 50,000 in the cubic centimetre. In four of the plates mixed with the *filtered* water I found three, five, nine and twelve colonies respectively, while in the remaining eight plates no colonies appeared for four days.

In the *third* class of experiments I mixed milk with dust, earth, cigar-ashes, dried cow-dung, etc., so as to change the white color of the milk to a decided gray. This milk was then filtered through layers of absorbent cotton of varying thickness. Numerous trials showed that a filtration through a thickness of one-quarter of an inch of cotton sufficed to retain all added impurities, so as to bring back the natural appearance of the milk.

It was but natural to presuppose that this filtration would change the consistency of the milk. *The fourth series of experiments* consisted therefore in first determining the quantity of *cream* before and after filtration, by means of Holt's tubes; further by determining the actual amount of *fat* by Marchand's lactobutyrometer, and at last in learning the *specific gravity* of the milk before and after filtration. In all thirty experiments showed beyond a doubt, *that the amount of cream* was *not altered* by filtering the milk through a half-inch layer of compressed absorbent cotton; that the *amount of fat* in the *lactobutyrometer* remained the same after as before filtration, and the *specific gravity* of the milk was not changed, unless so

much filth remained in the cotton as to explain the difference, an occurrence found but twice in thirty tests.

In the *fifth* series of experiments attempts were made to count the number of bacteria in the milk, before and after filtration. The method employed adhered strictly to the one used by Sior and Langermann, former assistants of Biedert, which is published in the *Jahrbuch für Kinderheilkunde*, May, 1892, and January, 1893.

Raw milk was poured into a sterile nursing bottle and a like quantity of the same milk was filtered into another sterile bottle. By means of a sterile graduated pipette, a $^1/_{100}$ cubic centimetre of the filtered milk was now dropped into each of three gelatine tubes, and then the same amount of the unfiltered milk into three other tubes. After fluidifying the contents of the tubes in the hot water bath and thorough shaking, so as to distribute the milk as evenly as possible, each tube was carefully emptied into a sterile Petri plate. The plates remained in a temperature of about 70° F. After twenty-four hours colonies were visible on all plates. It was noticeable at a glance that the plates containing filtered milk showed a much smaller number of colonies than those holding unfiltered milk. The actual count gave 3,800 germs to the cubic centimetre of unfiltered and 1,700 to the same quantity of filtered milk. Ten such experiments gave from 3,800 to 200,000 germs to the cubic centimetre of raw, and one-half to one-quarter of that quantity to the cubic centimetre of filtered milk. The larger numbers were seen in April, the smaller in March.

To find the number of germs in relative sterile milk before and after filtration, I took the necessary samples of milk from a nursing bottle in the *sixth* series of experiments which had been exposed to the steam bath for forty minutes, and added three of these to three gelatine tubes before and three after filtration. The plates remained in a temperature of 70° F. Colonies were not visible till after three days. On counting them on the fourth day the plates containing unfiltered milk had 5,600 colonies on an average, giving 56,000 germs to the cubic centimetre of

milk, while the plates holding filtered milk held but three, four and eight colonies respectively, giving thus 300 to 800 durable germs to the cubic centimetre of filtered milk. Later on during the warm weather of April, I had occasion to find up to 200,000 germs in the cubic centimetre of sterilized milk after three days. Ten experiments always gave enormous difference between filtered and unfiltered sterilized milk. My last cultures were counted on April 15th.

To test the accuracy of my own experiments in this direction without delay, I requested Dr. Otto Kiliani, of New York, to go over the same ground and to report the result of his experiments to me. The following constitutes his report:

DR. KILIANI'S REPORT ON THE FILTRATION OF MILK.

"At the request of Dr. A. Seibert, I have made a small number of bacteriological examinations, to show the effect of filtration through absorbent cotton upon the germinating capacity of milk. As the first and principal objection against filtering milk through cotton is, that the cream might be retained in the filtrating medium, thus depriving the former of one of its important components, I first repeated Dr. Seibert's experiments in this direction, and was surprised to find that in five different examinations for the quantity of cream, before and after filtration through cotton, the resulting values were identical, viz.: 9, 11, 10, 12, and 10. per cent. These measurements were made simply by Holt's lactometer, a method which, if not very exact, is at least sufficient for general purposes. Besides, the specific gravity of the milk proved not to be influenced by filtration through cotton, the values gained amounting to about 1.0315. I then investigated as to whether a watery solution of milk-sugar would lose any of its sugar by filtration through cotton. This proved not to be the case, the specific gravity of the sugar solution not being altered by cotton filtration; a 10 per cent milk-sugar solution showed 1026 at a temperature of 20° centigrade before and after filtration.

Having proved thus that the filtration of milk, and sugar solution to dilute the same, did not change their composition, we had to determine its possible value. Before giving the results obtained in my examinations, it is necessary to describe the methods applied, though they differ in no respect from the usual way. Six Petri dishes, two test-tubes and a chemical pipette with divisions of a cubic centimetre in hundredths were sterilized in a dry-air sterilizer, a temperature of 260° centigrade being kept up for two hours. The tin funnel to be used was put in the Arnold sterilizer with Seibert's milk bottles containing the milk to be examined. The cotton to be used was in a number of experiments, sterilized by steam and touched, as well as the funnel, only with instruments passed through the flame of a Bunsen's burner. This was done to get absolute results; while in another part of the experiments, the cotton (Johnson and Johnson's, or Seabury and Johnson's make) was simply taken with the hands out of a pound-roll of cotton, and put unsterilized in the funnel to imitate the way it will be used *in praxi*. The milk was supplied by an ordinary New York milk dealer. In the first experiment the milk was taken directly from the patent stoppered bottle in which it was brought to the house. The first test I made with raw milk as it came in the morning. All the other experiments were made with milk "sterilized" in the Arnold sterilizer from half an hour to an hour and a quarter.

The cultures were made as follows: A part of the milk was filtered through a funnel partly filled with cotton into a sterilized test-tube; $^1/_{100}$ to $^{10}/_{100}$ cc., were taken out with the sterilized pipette and dropped into another test-tube partly filled with nutrient gelatine, which had been liquefied just before, the neck of the test-tube having been drawn through the flame the well-mixed contents were poured out into a sterilized Petri dish which was kept covered from one to four days. For counting the cultures, the Petri dish was turned over a sheet of black paper placed under it, and the cultures, if not too many,

counted by the eye, while if they were very numerous, a netting of squares, each measuring a square centimetre, was applied, or they were counted by slowly drawing a black card across the bottom of the dish.

The results follow in tabulated form:

	Ccm. of milk.	Condition of the milk	Condition of the cotton.	*Number of colonies.	Number of germs to the cubic centimetre.	Hours of observation.	Proportion of germs in the unfiltered and filtered milk.
1.	0.01	Raw, morning.	Sterilized dry.	2,800	280,000	24	2 : 1
	0.01	Same, filtered.	" "	1,600	160,000	24	
† 2.	0. 1	Ster. 45 min.	" "	26	260	48	2 : 1
	0. 1	Same, filtered.		15	150	48	
† 3.	0. 1	Ster. 45 min.	Unster. "	30	300	48	2 : 1
	0. 1	Same, filtered.		16	160	48	
4.	0. 1	Ster. 35 min.	‡Unster. wet with boiled water.	32	320	48	8 : 1
	0. 1	Same, filtered.		4	40	48	
5.	0.01	Ster. 30 min.	" "	18	1,800	72	3 : 1
	0.01	Same filtered.		7	700	72	
5.	0.01	Ster. 30 min.	" "	20	2,000	72	4 : 1
	0.02	Same, filtered.		11	550	72	
7.	0.01	Ster. 30 min.	" "	22	2,200	72	5½ : 1
	0.03	Same, filtered.		12	400	72	
8.	0.02	Ster. 75 min.	" "	7	350	48	7 : 0
	0.02	Same, filtered.		0	——	48	
9.	0.02	Ster. 75 min.	" "	5	250	48	5 : 0
	0.04	Same, filtered.		0	——	72	
10.	0.02	Ster. 75 min.	" "	3	150	48	4 : 1
	0.05	Same, filtered.		2	40	48	
11.	0.02	Ster. 75 min.	" "	6	300	48	15 : 1
	0.05	Same, filtered.		1	20	48	
12.	0.01	Ster. 30 min.	" "	293	29,300	48	4 : 1
	0.02	Same, filtered.		149	7,450	48	
13.	0.02	Ster. 30 min.	" "	560	28,000	48	5 : 1
	0.04	Same, filtered.		232	5,800	48	
14.	0.01	Ster. 30 min.	" "	280	28,000	48	5½ : 1
	0.06	Same, filtered.		310	5,200	48	
15.	0.01	Ster. 30 min.	" "	300	30,000	48	10 : 1
	0. 1	Same, filtered.		300	3,000	48	
16.	0.02	Ster. 40 min.	" "	5	250	72	5 : 1
	0.04	Same, filtered.		2	50	72	
17.	0.02	Ster. 40 min.	" "	8	400	72	12 : 1
	0.03	Same, filtered.		1	33	72	
18.	0.05	Ster. 40 min.	" "	12	240	72	10 : 1
	0.04	Same, filtered.		1	25	72	

* Assuming that one culture is produced by one germ, which is not quite correct.

† 2 and 3 are taken from the same milk, and examined at the same time. No difference noticeable if sterilized or unsterilized cotton was used.

‡ Large quantity of milk filtered through, before the quantity to be tested was taken, to avoid dilution of milk.

In comparing the results, it appears without question that filtering the milk, reduces its germinating capacity considerably; and it also appears very clearly that this purefying quality of the cotton is intensified by moistening the latter. It is entirely useless to compute from these small statistics the exact figures, we must be satisfied with the rough estimate, according to the crude method of filtration, and we thus may say, that this filtration of milk through moist absorbent cotton removes about seven-eighths (⅞) of the germs contained therein before filtration."

In conclusion I will say that my youngest child, now six and a half months of age, has so far been brought up on sterilized milk, diluted by sugar-water filtered through cotton, since birth. For drinking and mouth cleaning filtered water has also been used exclusively. Since the first of April not alone the water and sugar but also the milk has been filtered before sterilization. The baby has not had green or diarrhœal passage since birth, has never had constipation, never regurgitates, and now weighs eighteen and three-quarter pounds at six and a half months, an increase of nine and a half pounds since birth. He has two teeth and is unusually strong and active. I mention this to practically demonstrate the feasibility of feeding infants on *filtered sterilized* milk, the quantity of course being regulated by the child's weight, according to the table published by me four years ago (*New York Med. Journal*, 1890).

There is no necessity to here dwell upon the importance of reducing the number of bacteria, and of the removal of the filth from the milk before sterilization. As practised now a small layer of absorbent cotton about the size of a silver dollar is entirely sufficient to filter a quart of milk in twelve to fifteen minutes, the milk running in a thin stream from the funnel. The sugar-water is filtered through another layer of cotton. I am having specially designed funnels, made of aluminum, that

will hold specially cut cotton discs and will insure steady, slow filtration.

137 East 19th St.

ALUMINUM MILK-FILTER.
Reymond & Gottlob, 830 Broadway, New York.

DISCUSSION.

Dr. Otto Kiliani, of New York City, said that he had made control - experiments to verify Dr. Seibert's reports. In these experiments, he had not gotten a single culture by infection from the hands or from the air, with the exception of one colony of fungus. He thought that to perform nineteen experiments in this way was good proof that the work had been carefully done.

The value of filtration of milk as an aid to sterilization might be questioned, because Soxhlet's original rule was to sterilize an hour and a quarter. One would think that should be sufficient, and that no other complication should be necessary; but practically sterilization was not done as long as that in the household. The general rule seemed to be, thirty minutes in winter, and one hour in summer. He had found by experiment that in actual practice the sterilization of the milk fell short of our expectations. In some cases the number of germs was reduced to one-tenth. If, then, by simple filtration through cotton the number could be reduced to one-eighth, it was nearly as good as sterilization, and it was worth a practical test.

Cotton that had been used, and was wet, if it had not been used too long, was better adapted for filtration purposes than dry cotton. The latter contained a great deal of air, which was driven out, and a great many germs were thus carried through. If he might express an opinion as to the practical value of this filtration, he would say that if futher trial proved that filtration really did materially aid the sterilization, as it certainly seemed to

do, then it should be adopted. It was just as easy for the mother or nurse to pour the milk through a funnel with cotton, as through a funnel without cotton.

Dr. L. Emmett Holt, of New York City, said that if Dr. Seibert could get one-eighth of the germs out by filtering once, why not filter again, and get more out. Even coarse cheese-cloth would filter out germs. Three or four years ago he had experimented with the screen in the cold-air box put in his house by the New York Steam Heating Company, and, if he remembered correctly, he had obtained one hundred and fifty cultures to a Petri plate after a minute's exposure outside the screen, while on the inside during the same time, he obtained only fifteen cultures.

Dr. Floyd M. Crandall, of New York City, suggested that the mother would be disgusted by seeing the dirt on the cotton.

Dr. Caille, of New York City, said that about four years ago he had sterilized milk in a bottle, and had corked the bottle with sterilized cotton. The bottle was still in his possession, and although nearly all the milk had evaporated, what remained was still absolutely sterile. He thought Dr. Seibert's suggestion was excellent. If one could get out the greater part of the bacteria, we might eventually make use of filtered milk exclusively. This would appeal to the judgment of some who thought that a temperature of 212° changed the milk. Personally, he did not accept this view. If the milk must be sterilized after being filtered, then the filtering was not so important. Sterilization alone would kill all the bacteria whether these were one hundred or one million, But as filtraton would remove the dirt, the suggestion was very important, and he thought the mother would be delighted, rather than digusted, by the operation.

Dr. Seibert said that he wished his experiments to be looked upon simply as a small step in the right direction. He did not wish to go on record as opposed to sterilization; on the contary, he would sterilize now more than ever before, because he knew that the milk was much

more sterile if it were first filtered through cotton. The cream was not filtered out by the cotton, and the process was inexpensive.

In a recent interesting article, entitled "Sterilization and Pasteurization," a Russian had reported a large number of experiments, and shown beyond question that Pasteurizing did not kill sufficient germs to reduce the number to five thousand germs per cubic centimetre. Milk with five thousand germs to the cubic centimetre was considered clean milk, comparatively speaking. This Russian had also shown that milk boiled in an ordinary covered pot for thirty minutes would have just as small a number of bacteria, and would keep comparatively sterile just as long as milk sterilized in a nursing bottle; and if this same boiled milk were poured into another vessel—say a quart bottle that was comparatively clean—and if this were immediately laid on ice, an enormous quantity of bacteria would develop in the next twenty-four hours in spite of the low temperature. Therefore, the speaker thought if the milk could not be sterilized in bottles, the mother should be induced to boil it in a covered pot for thirty minutes, and to pour out the necessary quantity every two or three hours during the day. Regarding filtration, another practical point was, that during epidemics of cholera and typhoid fever, a person traveling by rail would be pretty safe in drinking the water on the cars, if he carried with him a funnel, and a little cotton through which he could filter the water.

Replying to Dr. Holt's question, Dr. Seibert said that if the milk were filtered very often, too much milk would be lost, and practically speaking, filtering once was sufficient.

Dr. Holt asked if there were less germs after filtering twice why not do it.

Dr. Seibert replied that he would be satisfied if the mother filtered the milk only once. He had filtered the same milk twice and three times without affecting the amount of cream at all.

Dr. W. S. Christopher, of Chicago, asked if, before the

milk was filtered, a quantity of boiling water were poured through the cotton, would the milk filter just as well.

Dr. Seibert replied that Dr. Kiliani had discovered that it was best to filter through moist cotton. The cotton was best moistened by allowing a tablespoonful or so of milk to run through but not into the bottle intended for the filtered milk. The majority of the bacteria were found in the very first milk that passed through.

Dr. Christopher said that what he meant to ask was, if a quart of boiling water were first passed through the filter, could the milk be properly filtered through it subsequently.

Dr. Seibert said that he had not tried that experiment.

CONGENITAL CONSTIPATION.*

BY F. HUBER, M.D.,

New York.

Dr. Jules Simon, in a lecture delivered before the Paris Hospital for Sick Children (*Journal de Médicine et de Chirur.*, May, 1890) calls attention to the fact, that while diarrhœa occurring in children is the object of the most extreme solicitude both on the part of parents and of physicians, constipation, which possesses almost as great danger, is almost entirely neglected. These remarks apply particularly to constipation at an early age in infants. The nurse or mother, considering the trouble too trivial to consult the physician, contents herself with administering cathartics, occasionally giving an enema, or employs a suppository of soap, molasses candy, glycerine or oiled paper, and thus establishes a habit attended with pathological results.

Acute and chronic constipation in children is discussed in an able and scholarly article by Dr. C. W. Earle, in Keating's Cyclopædia of the Diseases of Children—a deserving tribute being paid by the author to J. Lewis Smith's valuable contribution on the subject (Diseases of Children, Ed. 1886).

The article by Jacobi, "On Some Important Causes of

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*Read by the Recorder.

Constipation in Infants," is classical, and though it appeared in 1869, in the *Am. Jour. of Obstetrics*, Vol. II., it will repay careful reading and study at the present time.

The abnormal conditions of the milk or infant food, insufficient development and diminished functional activity of the muscular layer of the intestines, defective innervation or local obstruction are well recognized causes. Not infrequently we meet with a different class, to which attention has been directed by Prof. A. Jacobi in the article above referred to. The affection is congenital, dating from the first hours of life, and depends upon the normal anatomy of the colon in the fœtus and new-born infant.

The little patients are otherwise apparently in poor health, the alvine evacuation dry, sparse and infrequent, the watery element having been absorbed in the reduplication of the colon.

As a text for the remarks to follow I shall briefly detail the following case.

Charley D., five weeks old, has been troubled since birth with constipation and cramps; he would cry a great deal and was extremely restless. The mother had been in the habit of giving him fennel and catnip tea, in addition to breast milk. The bowels did not act spontaneously, but were moved occasionally by means of castor oil.

When called to see the patient, I found a fairly healthy child, evidently in great pain, crying incessantly, straining and kicking his limbs. Vomiting had existed for two days, the matter ejected consisted of thin fæces, and the act being repeated every few minutes. No evacuation from the bowels for two days, not even passage of wind.

The abdomen was swollen, tympanitic and tense; palpating carefully an indistinct elongated swelling could be made out running transversely across the abdomen for a distance of two inches about the level of the umbilicus. Temperature in rectum, 102°.

An examination of the umbilical and inguinal openings excluded the existence of strangulated hernia. Rectal exploration with the finger gave a negative result, no tumor, constriction or other abnormality being detected.

The tense condition of the abdominal muscles with tympanites and pain attended with fever, might suggest

a peritonitis. During the first few weeks of life, peritonitis, in my experience, is usually septic in origin and is secondary to suppurative umbilical phlebitis, ulceration and suppuration of the umbilical stump, erysipelas of the navel or abdominal walls. In one instance under my observation peritonitis followed an erysipelas of the genitals in a little girl about four weeks old.

Intussusception, the most frequent cause of acute obstruction of the bowels in infants, was excluded by the absence of marked prostration and shock, no tumor to be felt in the rectum, nor were there any bloody or mucus discharges from the bowels.

Constipation of rachitis usually occurs during the second and third months, the bowels in the earlier months acting naturally.

Thus by a process of elimination and exclusion, the diagnosis of acute intestinal obstruction engrafted upon a constipation existing since birth, "congenital constipation" was arrived at, the intestinal obstruction being due to the impaction of fæces in the reduplication of the sigmoid flexure.

The above illustrates very well the history of an aggravated case, one frequently misunderstood, maltreated or neglected. When this condition is present in a moderate degree only, we notice in addition to the constipation, slight gastric disturbances, with distension of the abdomen and tenesmus; if more pronounced, febrile movements with intense restlessness are observed; finally, as in the above instance, the obstruction may be complete and give rise to bilious and later on fæcal vomiting.

In the milder cases it is a trivial affair, if recognized and properly treated; in the severer grades, it is not only serious, affecting the patient profoundly, but life itself may be placed in jeopardy, and we may be confronted with a state in which a resort to operative measures seems to be the only alternative—even now an intelligent recognition of the cases enables one to relieve the urgent symptoms and to carry the patient safely through.

As the outgrowth of this congenital constipation, we

have many instances of ulceration, fetid diarrhœa, septic auto-infection, fevers sailing for months under the flag of malaria, and continued fever.—Jacobi, *Med. Rec.*, May 19, 1894.

To return to the pathology, the following is taken from Jacobi's article:

"The length of the intestinal tract is much greater (in proportion) in the later periods of fœtal life than in the adult, while it is but inconsiderable in the early months of utero-gestation. The small intestines of a fœtus of eight months are twelve times as long as its body, while the proportion in the adult is but eight to one. The colon has a length two and two-third times as great as the body in a fœtus at full term, while the same proportion in the adult is that of two to one. Now the ascending and transverse divisions are very short in the fœtus and new-born; thus the descending colon, having to make up for the difference, is the longer in proportion. While, then, the whole intestinal tract grows but slowly in the young fœtus, it increases rapidly in the mature fœtus, and diminishes in proportion some time after birth.

Meanwhile the pelvis grows very slowly in the latter period of utero-gestation, and the long colon descends, with the sigmoid flexure and the rectum, finds no space for comfortable accommodation as to later life. This disproportion remains, as we have had scores of opportunities to convince ourselves at the dissecting table, sometimes for six to ten years.

The consequence of the long colon being crowded downwards by a narrow abdomen, large liver, etc., into a narrow pelvis are a number of curvatures instead of the one sigmoid flexure."

The clinical bearings of these anatomical facts lead us to the following deductions: the descending colon in the new-born and young infant is proportionately very long, the space to which it is confined being too narrow, folds and curvatures result; the progress onward of the intestinal contents is more or less retarded in its passage through the reduplicated divisions of the canal, the ab-

sorption of the fluids is facilitated and the fæces consequently become hard and dry, and thus give rise to the physiological obstruction incidental to this early period of life.

In one of Jacobi's cases the colon turned three times upon itself, these flexures covering one another in such a manner that the subjacent one was always about half an inch longer than the one above it.

The pathological condition having been recognized, the diagnosis is not difficult and the treatment is simple.

The principal indication is to relieve the obstruction. This is best accomplished by distending the lower bowel with fluid. By this means the reduplications are gradually unfolded from below, and the potency of the canal is restored.

High rectal injections must be employed and the treatment must be persisted in for years—until the pelvis increases in size and the proper relation has been established between the colon and the sigmoid flexure.

At times the fæcal contents are under considerable pressure, and as soon as the lower portion of the gut is distended and the obstruction overcome, the alvine discharges are frequently projected a distance of several feet. In the aggravated case referred to above, the hips were raised and high enemata of warm water and olive oil were carefully made every few hours, the bag of the fountain syringe being held about six feet over the level of the body. After a number of fruitless attempts, the unfolding began and the obstruction finally yielded, large quantities of fæces escaping. The amount passed was surprisingly large and fully established the correctness of the diagnosis. Any increase in the intra-abdominal pressure increases the obstruction by compressing the reduplications—crying, straining or vomiting must be avoided or relieved as quickly as possible. Small and repeated doses of calomel, gr. $\frac{1}{20}$ dry upon the tongue, were given every two hours. Oatmeal water ʒj doses every few moments and the breast once in four hours.

As soon as the bowels were moved, the vomiting

ceased. Subsequent treatment, daily injections; oatmeal water internally, and occasionally small doses of calomel.

The child now about four years old, has been under observation at intervals since, and though it still suffers from constipation, the continued use of injections has prevented any subsequent obstructions.

In concluding permit me to present the following from Jacobi's address before the Medical Congress at Rome.

"The occasional indication is to regulate the diet, to administer, in rare cases only, a purgative drug; to insist as a rule, however, upon the avoidance of medicines, and the administration of regular enemata, and *non nocere*."

DISCUSSION.

Dr. W. L. Stowell, of New York City, said that he had used ox-gall, sweet oil, and sometimes, turpentine, where there were hard scybalous masses, not only in infants, but also in adults, and persisting in such treatment he had always been able to move the bowels in cases such as those mentioned.

In answer to a question from Dr. Jacobi as to whether he used ox-gall and oil day after day, and week after week, he said that he had not continued it for any great length of time.

Dr. Fruitnight said he was of the opinion that water should be administered freely, as many of these cases were due to the absorption of the water from the intestine.

Dr. Forchheimer said that the osmotic equivalent of the intestine of an adult was infinite, so far as water was concerned. He had intended to make a positive physical examination to determine the osmotic equivalent of an infant's intestine. From clinical experience he would say that this was not the same in an infant, but that by adding fluids the condition of the intestinal processes could be changed, regardless of peristalsis. It would be a very easy thing to determine this point, but he had not yet had an opportunity to do it. Digestion, and certainly absorption, in the infant, were different processes from what they were in the adult in this respect.

DR. C. W. TOWNSEND'S CASE OF CONGENITAL RICKETS.

THE HÆMORRHAGIC DISEASE OF THE NEW-BORN*.

BY CHARLES W. TOWNSEND, M.D.,

Boston.

The self-limited and definite character of certain forms of hæmorrhage among the new-born was impressed upon me by an analysis I made some three years ago of thirty-two cases of this affection.† Having observed eighteen cases of this disease since then, it seems to me of interest to class them all together under one head, which I have called the Hæmorrhagic Disease of the New-born.

Although, as I shall show later, the etiology of this disease may be very various, there are certain characteristics which pertain to all the cases, so that for practical purposes it is desirable to study the affection under one head.

Of the fifty cases, forty-five occurred in the Boston Lying-in Hospital, four in the out-patient department of the hospital, and one was seen in consultation practice. Thirty-one of these died and nineteen recovered—a mortality of 62%.

In speaking of hæmorrhage in the new-born, it is a common error to think only of bleeding from the navel. That the disease is in most cases a general disease, and not limited to one spot, as the navel, is shown by the fact that there were only three cases out of my fifty where the navel was alone found bleeding, and it is very possible that in these three cases there was some internal, undiscovered hæmorrhage. In other words, when bleeding occurs in the new-born it is apt to occur from various parts of the economy, the affection being a general and not a local one.

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*Read by title.

†Hæmorrhages in the New-born. Boston Medical and Surgical Journal, August 27, 1891.

The following table gives the various sources of the hæmorrhage:

	CASES.
Intestines	20
Stomach	14
Mouth	14
Nose	12
Navel	18
Ecchymoses of skin	21
Scratch of skin	1
Cephalhæmatoma	3
Meningeal	4
Abdominal cavity	2
Pleural cavity	1
Pulmonary	1
Thymus gland	1
From the gastro-enteric tract, nose, navel and ecchymoses	3
From the gastro-enteric tract alone	19
From the navel alone	3
From the ecchymoses alone	6

Slight, uncomplicated hæmorrhage from the uterus or vagina, pseudo-menstruation, is not very uncommon in the first few days of life. and is not included in this list.

Another point which is of interest is that the disease runs a very definite course, either to death or to complete recovery, within a definite time. This self-limited nature is characteristic of acute infectious diseases and suggests a relationship to them.

Of the fifty cases the bleeding first showed itself, in all but three, within the first seven days of life, the exceptions being on the eighth, ninth and fourteenth days. The majority of cases began on the second or third day, thirteen starting up on the second, and sixteen on the third day, while only eight began on the fourth, and two on the first day. That the duration of the disease is brief is shown by both the fatal cases and by those that recovered. One half of the fatal cases lasted one day, or less;

all the others died within a week, except one case that died of the effects of the hæmorrhage on the eighth day, several days after the bleeding had ceased. Of the favorable cases, all recovered within nine days, two-thirds of these recovering within five days.

This self-limited character is widely different from that of hæmophilia in the true sense of the word, an inherited disease whose hæmorrhagic tendency continues as long as the patient lives. Yet it is a common mistake to speak of these cases of hæmorrhage in the new-born as cases of hæmophilia, and a very hurtful one from the point of view of prognosis and treatment. The fact is true hæmophilia in bleeder families is rarely seen before the end of the first year, while infants who bleed during the first days of life and recover are not apt to bleed in after-life. Moreover, a family history of bleeding is not found in these infantile cases. Instances have been recorded, one by Dr. Rotch, of circumcision being performed a few days after recovery from this hæmorrhagic disease of the new-born, without unusual hæmorrhage taking place.

In four of my cases hæmorrhage had taken place from the base of the cord as well as elsewhere, but the patients recovering the cords dropped off, one in two days, the other three in four days after the cessation of the disease, without starting up a fresh hæmorrhage.

Another point of difference between hæmophilia and the hæmorrhagic disease of the newborn is that the sexes are about equally represented among the new-born, the preponderance, if any, being among the males (thirty males to twenty females in my list), while among true bleeders females very largely predominate, the proportion being 13 to 1.

I have laid a good deal of stress on the distinction between cases of hæmorrhage in the new-born and true hæmophilia, and on the brief duration or self-limited course of the disease, as with this knowledge we can approach a case in a more hopeful spirit. My consultation case is one in point. A boy on the third day of his life developed ecchymoses on his head and groin and on one foot.

There was also bleeding from high up in the bowel on the fifth and sixth day, the dejections being tarry from altered blood and simulating meconium. I saw the child for the first time on the seventh day of its life, the fourth of the disease. The physician in charge said to me the child is of course a bleeder, has hæmophilia, and if it does not die now, will die from some cut or scratch later. He had given the family this gloomy prognosis. Two days later the child developed a marked paralysis of the left side of the face, and to a less degree of the left arm and leg, presumably from meningeal hæmorrhage. I still refused to give a fatal prognosis as the child had, from its color, evidently lost but little blood and continued to be well nourished. On the seventh day of the disease there was beginning improvement in the paralysis, and it was apparent that no more hæmorrhages occurred.

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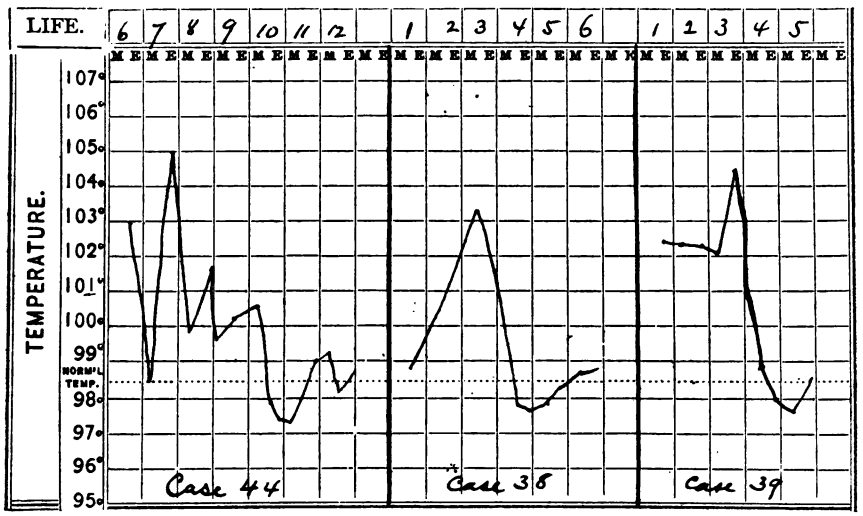
On the twelfth day the paralysis of the left arm and leg had disappeared although the face still remained paralyzed on the left side. On the fifteenth day the head began to swell, careful measurements having been taken every day, and it was believed that an external hydrocephalus had developed. The child eventually entirely recovered and is now nearly three years old and perfectly well. In this case the physician in charge believing that the case was a "bleeder" and hopeless might have let the child die by not insisting on great care in feeding. The belief that the disease was self-limited, with careful artificial and wet-nurse feeding, the mother's supply proving a failure, was what saved the baby.

Another point which links some of these cases together, and which, like the self-limited character, suggests an infectious nature, is the elevated temperature observed in some. In fourteen cases the temperature of these infants was studied and in all but two was found to be elevated at first from 101° to 103°, in one case to 106°, and later, on cessation of the hæmorrhages, to sink to normal, often becoming subnormal. The two exceptions to this rule were in reality not exceptions as the temperature was not taken until the second stage of depression was reached.

The following charts are given as representative of these cases.



The frequency of this affection in the hospital itself as compared with its frequency in the out-patient department is of interest and suggestive of the infectious nature. Thus forty-five cases occurred in the hospital out of a total of 6,700 deliveries, or a percentage of .67, about two thirds of one per cent.; while in the out-patient department, among 4,000 deliveries, there were four cases or one-tenth of one per cent. This prevalence in hospitals has been observed by others, notably Ritter, at the Prague Foundling Hospital. This comparative prevalence in the hospital has no connection with puerperal septicæmia, as this disease is practically eradicated from the Boston Lying-in Hospital, but it occurs independently of it, just as thrush may get a foothold and flourish in a hospital, although it is not common in outside practice.

The tarry or meconium character of the stools in the case related above from bleeding high up in the intestine with digestion or decomposition of the blood, leads me to say that this may sometimes cause the disease to be overlooked. Usually in these cases a slight pink halo surrounds the dejection on the napkin from the staining of the blood. Of course where the bleeding is lower down,

or soon voided, there is no mistaking it. Where the existence of blood in the stools is doubtful the corpuscles may be recognized under the microscope, or, where even this is impossible from disintegration, as was the case with two of my series, I succeeded in finding hæmine crystals by a simple test.

A drop of the semi-liquid stool is mixed with a little glacial acetic acid and a few crystals of common salt on a glass slide and heated to boiling. On drying, the dark-brown rhombic crystals of hæmine are easily recognized under the microscope if blood is present.

The post-mortem examination made in nine of these cases throws no additional light; the source and position of the hæmorrhages were found, but in no case any gross lesion of the mucous membrane or blood vessels. In one case cultures were made by Dr. Councilman from the blood, with negative results. In looking up the literature of the subject I found the records of 81 autopsies. In the majority of cases nothing abnormal was found except the hæmorrhages and the resulting anæmia. In a very small number of cases the following diseased conditions were found: syphilis, enlarged spleen, enlarged liver, inflammation of the umbilical and portal veins, acute fatty degeneration.

As regards treatment, if we have in mind that the disease is self-limited, we will not give up a case as hopeless, but will do everything to tide it over the critical period. Perfect quiet, most careful and persistent feeding from spoon or dropper with milk drawn from the mother or wet-nurse, or careful artificial diet may be all that is necessary to prevent a fatal issue. Warmth in the stage of collapse and alcoholic stimulants even in the stage of bleeding seem to me to be beneficial. I am very sceptical as to the value of astringents, ergot or mineral acids for internal hæmorrhage in these cases. External bleeding from scratches or from the umbilicus are best checked by intelligent and persistent pressure. Styptics are unsatisfactory. The actual cautery is sometimes successful. The mortality in my cases was 62 per cent. In 709 cases col-

lected from various authors the mortality was 79 per cent., probably because many mild cases were overlooked.

In conclusion let me sum up briefly the various causes that have been given of this affection. True hæmophilia stands first; and this, as I have shown, is not a cause except possibly in rare instances. Prolonged and difficult labor: it is stated in the American Textbook of the Diseases of Children just published that "by far the most frequent cause, however, of hæmorrhage in the new-born is direct mechanical injury received during birth." This is certainly not the case. In only six was the labor difficult among my 50 cases (one version, one high forceps and four low forceps), and in many the labor was particularly easy. Early ligation of the cord, plethora, debility, retention of the meconium, difficulty in the establishment of the pulmonary circulation may possibly, one or all, act as exciting causes; but one or several of these conditions including difficult labor are so frequently met with, without such dire results to the child, that they can, it seems to me, be properly excluded from the true causes. Moreover, cases of hæmorrhage occur without these exciting causes. Syphilis is undoubtedly a cause in some instances, this being so in three of my cases.

Acute infectious diseases such as small-pox, typhus fever, etc., predispose to hæmorrhage. Septicæmia in severe form from infection of the umbilical wound is another possible cause. In none of my cases did it seem probable that this was the case. Only two of the mothers of these children suffered from puerperal septicæmia, and those only in a mild form.

The general and not local nature of the affection, its self-limited character, the presence of fever and the greater prevalence of the disease in hospitals would certainly suggest an infectious character, in some cases at least, of this hæmorrhagic disease of the new-born.

NOMENCLATURE OF DISEASES OF THE MOUTH.

The Report of the Committee of the American Pediatric Society.

AT a meeting of the American Pediatric Society in 1892, a vote was passed by the Society that owing to the manifest incongruity of the terms used to represent the various diseases of the mouth in infancy and childhood, it was advisable to revise the nomenclature of these diseases. A committee consisting of Dr. Forchheimer, of Cincinnati and Dr. Rotch, of Boston, was then appointed to undertake this revision. At the meeting of 1893 Dr. Rotch, as Chairman of the Committee, presented a provisional report. The report was laid on the table for further consideration.

At the meeting in 1894 Dr. Rotch presented the following revised nomenclature which was adopted by the Society. In presenting their report the Committee wished it to be understood that this nomenclature was only a provisional one made for the purpose of getting rid of imperfect and misleading names and to enable writers in different parts of the world to understand whether they were writing about the same or a different disease and thus to receive some benefit from each others' investigations. The Committee also stated that while they were unable to give a specific name, or rather the true name, to the disease commonly known as Thrush, they could, on the other hand, state that it was not caused, as was formerly supposed, by the Oidium Albicans. They were therefore forced to provisionally use a general term which they knew included the real future name of the disease. The Committee also explained that they had for purposes of uniformity adopted the general name Stomatitis, as in their belief this condition was found to underlie to a greater or less degree all diseases of the mouth.

PROVISIONAL NOMENCLATURE OF THE DISEASES OF THE MOUTH, ADOPTED BY THE AMERICAN PEDIATRIC SOCIETY, JUNE, 1894.

- STOMATITIS
  - Catarrhalis
    - Simplex.
    - Exanthematica (Secondary to the Exanthemata)
    - Traumatica
      - Mechanical,
      - Thermal,
      - Chemical.
  - Herpetica — Aphthosa.
  - Ulcerosa
    - Scorbutus,
    - Mineral Poisons
      - Arsenic,
      - Lead,
      - Mercury.
    - And other diseases.
  - Mycetogenetica
    - Hyphomycetica (Thrush)
    - Pseudo Membranosa
      - Diphtheria,
      - Tuberculosis,
      - Syphilis,
      - and like diseases.
    - Gangrenosa — Noma.

Committee { T. M. Rotch, M.D., Boston. F. Forchheimer, M.D., Cincinnati.

THE NOMENCLATURE OF DISEASES OF THE GASTRO-ENTERIC TRACT.

The Report of the Committee of the American Pediatric Society, May 1894.

At a meeting of the American Pediatric Society in 1892 the undersigned were appointed a committee by the society to revise the nomenclature of the diseases of the stomach and intestines in infants and young children, in order, if possible, to arrive at some uniform conclusion, to get rid of many terms which have come to possess a very doubtful significance, and to make a place for new ones representing our present knowledge. A preliminary report was presented at the meeting of 1893. After free discussion this report was laid over or one year for further consideration and revision. At the meeting in Washington, May, 1894, a revised report was presented to and finally adopted by the Society in the form given below.

Any nomenclature is necessarily a provisional one, and

the society does not wish to be understood as claiming anything more for the one here proposed. At the same time it is believed that it is a great advance upon the unmeaning and misleading nomenclature now current, and that a place will be found in this revision for the further knowledge of this subject which is coming to us in the near future.

The Society decided to adopt as a name for this nomenclature "Diseases of the Gastro-Enteric Tract."

The following are the reasons for adopting a new nomenclature and the knowledge on which the Society based their conclusions.

1. There are many gastro-enteric diseases which with our present knowledge it is impossible to classify, but a new and better classification is necessary to simplify further investigation, and justifiable from the immense advance which has been made in our knowledge of this class of diseases.

2. A practical nomenclature should be made from where the stress of the lesions exists, rather than from all the lesions which are included in the pathological diagnosis.

3. This classification has reference to infants and young children, as distinguished from older children and adults, whose pathology and symptoms often differ materially from those belonging to early in life.

4. Infants and young children succumb to the early stages of disease sometimes before the later lesions and resulting symptoms have time to develop.

5. As the only symptom which shows the stomach to be involved whether from reflex, functional or organic conditions, is vomiting, the most simple way of approaching the subject is to classify diseases of the stomach alone and those of the intestine alone, but in the latter case to state in which of the diseases the stomach may be involved.

6. By the term *reflex* we mean an irritation peripheral, with a resulting action. By *functional*, a disturbance of

the function of the organ without a known lesion. By *organic*, a known lesion.

7. Special organic lesions of the stomach alone are very rare and are still rare even in connection with organic lesions of the intestine.

8. Vomiting as a symptom is often very misleading for diagnosis, and should not be considered as indicative of any one disease.

9. The pathological anatomy of the gastro-enteric tract of infancy and early childhood is essentially that of the ileum and colon.

10. Grave lesions at the autopsy may be found where the intestinal symptoms during life were very mild.

11. Serious symptoms during life are often represented at the autopsy by no pathological lesion.

12. It is probable that a large number of diarrhœal cases have for their primary cause some form of bacteria, also, that the variety of bacteria is great, but that it is their products which are the essential cause of the toxic symptoms.

13. Intestinal discharges are often very misleading for diagnosis.

14. Marked diarrhœa may exist during life and no lesions be present at the autopsy.

15. Serious lesions may exist and yet no blood appear in the dejections.

16. Blood may appear in the dejections and yet presumably no serious lesions exist, the hæmorrhage being only temporary and comparable to epistaxis.

17. The temperature is very important for classification. An elevated temperature of short duration points toward functional and toxic disturbance. An elevated temperature long and continued points toward inflammatory lesions.

18. In those cases in which deeply marked lesions are present the stress of the lesions is usually upon the lower ileum and the colon, and very frequently only in the

colon; therefore, the terms ileo-colitis and colitis seem more descriptive than enteritis or entero-colitis.

19. The membrane in ileo-colitis pseudo-membranosa is often extensive, but sloughing and perforation are exceedingly rare in young children.

*20. Eliminative. Under this term may be grouped a class of cases as yet very imperfectly understood, and in which certain morbid products are eliminated from the blood through the gastro-enteric tract, *e. g.* urea.

*21. It is supposed that all ulcers of the gastro-enteric tract are not necessarily inflammatory.

*22. We can draw no absolute line between non-inflammatory and inflammatory cases, since conditions which begin as the former may easily run into the latter, the classification being made according to the stress of the condition.

DISCUSSION.

Dr. Caillé said that when the committee had sent the chart to him, he had looked it over carefully, and had come to the conclusion that it was complicated ; and, as in the present state of our knowledge he could not see his way clear to a proper and simple classification, he had not made good his promise to report to the committee.

Under the heading "Functional Diseases of the Stomach" appeared the word "dentition." There was no proof that dentition would produce vomiting, and he was absolutely opposed to the introduction of that term as one of the causes of vomiting.

Next, under "Chronic Functional Diseases of the Stomach," "indigestion" appeared. Chronic stomach indigestion, as a rule, was not functional alone, but also mechanical. There might be motor insufficiency of the stomach, dilatation of the stomach, and atrophy of the glandular tissue, and these, of course, would produce chronic indigestion. To pronounce this functional was, in his opinion, absolutely wrong.

Ulcers were mentioned among the non-inflammatory organic diseases. He was almost positive that there was no form of ulceration without inflammation. Even the thrombosis of vessels ending in ulceration was inflammatory. An ulcer of the stomach should not be classed as "non-inflammatory." These were his objections in regard to the gastric side of the paper.

New Growths.

Appendicitis

Organic....

Acute.....

Ileo-Colitis or Colitis..

CATARRHALIS.

Ileum and Colon chiefly affected.
Stomach apt to be involved.
This form includes the non-ulcerative form of Follicular Inflammation.

ULCERATIVA FOLLICULARIS.

Ileum and Colon chiefly affected.
Stomach not apt to be involved.
Mainly a Follicular Ulceration.

In both these forms the lesions are so varied that they probably arise from a number of organisms. Their Pathology must for the present be collectively all forms which cannot be classed under the Pseudo-Membranous and Amœbic. They may occur as an acute primary disease, but are usually Secondary to the Fermental Diarrhœas, and sometimes to the general infectious diseases, especially measles.

PSEUDO-MEMBRANOSA.

(Sporadica or Epidemica.)

Ileum and Colon chiefly affected.
The lesions are probably due to a number of organisms.
The Pathology is characterized by the presence of a membrane on the surface and extending into the mucous mem-

extra specialis

Dr. Holt said that so far as reflex was concerned, the classification had nothing to do with dentition.

Dr. Seibert asked what tubercular meningitis and pneumonia, although often accompanied by vomiting had to do with the gastro-enteric tract? To express it mildly, he thought it was entirely wrong to talk about "central stomach affections." The vomiting of pregnancy was no more a disease of the stomach than diabetes a disease of the kidneys. In classifying diseases of the stomach, we should include such pathological conditions as originated primarily in the stomach, and then in an appendix remind the reader that there was such a thing as gastro-enteritis caused by the pneumococcus during an attack of pneumonia, etc. But the so-called central lesions had nothing directly to do with diseases of the stomach and intestine.

His second objection referred to catarrhal gastritis, for there was no such thing any more than there was a catarrhal laryngitis, a catarrhal bronchitis or a catarrhal affection of anything. The word "*catarrhalis*" had no more right in scientific medicine of to-day than dentition had, as the cause of disease. He would suggest instead of *gastritis catarrhalis*, *gastritis infectiosa*, and sub-divide that into *infectiosa simplex* and *infectiosa febrilis*. If a child had a temperature of 104° or 105° immediately after nursing, simply from the infectious character of the food, and with little or no diarrhœa, he would call it a case of *gastritis infectiosa febrilis*.

The portion of the report relating to gastric diseases was then adopted.

It was then moved, and seconded, to adopt the enteric portion of the report down to and including functional diseases.

Dr. Caillé said that he could not understand how chronic infantile atrophy could be classified as a functional disease. It was not purely functional, as investigation had shown. There were always in the chronic forms of infantile atrophy some mechanical interference or structural change, and it was therefore wrong to classify chronic infantile atrophy as a functional disease.

Dr. Rotch said that he did not think the latest investigations upheld the view just expressed by Dr. Caillé. In Dr. Holt's cases, absolutely nothing abnormal could be found.

Dr. Seibert said it would be better to put "Nervous Excitement" under the heading "central," than the words

"heat and cold." Where was the "heat or cold" capable of causing acute diarrhœa? He protested against putting his name down as a member of a society believing such things. Nervous excitement could cause diarrhœa, but he had never seen diarrhœa from heat or cold.

The report down to, and including the word "Eliminative" was adopted.

It was then moved and seconded, to adopt the remainder of the report.

Dr. Holt said the question was—is there a disease—a form of diarrhœa, which may be fatal and which is not inflammatory? Dr. Booker's case was undoubtedly one of very severe enteritis. The speaker thought true cholera infantum was a very rare disease; but there were cases really toxic and not due to an inflammation of the intestine, which did not on autopsy show cell infiltration. He thought a great many of the cases called cholera infantum were not really cases of this disease. He would favor making the correction mentioned by Dr. Booker as to the colon bacillus.

Dr. Seibert, referring to Dr. Holt's question as to whether there was such a disease without pathological changes, said that it had been thought that Asiatic cholera was such a disease, but in all cases the primary lesion was in the mucosa of the intestine. It was sometimes not found because the cases died too late. In cases in which death took place early, the lesions had always been found. Secondary pathological lesions were constantly found in the kidney, as in cholera infantum. During the recent epidemic of Asiatic cholera necropsies showed lesions in the intestine in all cases dying early, and in all the severer cases that had lasted long enough the secondary inflammation of the kidney had been found invariably. From his experience with cholera infantum Dr. Seibert thought it could not be anything but a local infection of the alimentary canal, the bacteria first attacking the mucosa and the toxines being absorbed from there. As to true cholera infantum being rare, he differed with Dr. Holt. It was a fact that hundreds of patients with a mild form of diarrhœa had been suffering from Asiatic cholera, and had never been in bed throughout their illness. He believed it was the same in cholera infantum, namely a question of quantity. A large number of bacteria in milk taken into an infant's alimentary canal will cause a severe attack of cholera infantum, a small number will cause but a mild attack of diarrhœa. The disease is the same, only differing in intensity.

Dr. Caillé said that although going on record as opposed to the classification of the committee, he admired the work of the committee They had endeavored to classify disease from the mouth to the anus, with diarrhœa and vomiting as central, guiding symptoms. Such a task was as difficult as classifying diseases of the respiratory tract from the mouth and nose to the air cells, using cough as the guiding symptom. The committee had done excellent work, and had overcome difficulties which had seemed almost insurmountable ; yet their classification would be changed in a few weeks, or it might be changed in a day.

In going on record, therefore, as opposed to the adoption of this classification, he did not mean to say that the committee had not done excellent work.

He then moved that a vote of thanks be tendered to the committee for its arduous labors. Seconded and carried.

Dr. Holt stated that the report of the committee was merely provisional, and as soon as it was shown by future investigations that a disease could be transferred from one class to another, it should be done.

Dr. Christopher said that the classification which he had employed with reference to these diseases in teaching and writing had been so entirely different from that given by the committee, that he had not cared to discuss the report at all.

CONGENITAL HYPERTROPHY OF THE FINGERS.*

BY FRANCIS HUBER, M. D.,

New York.

THE cast presented was taken when Charley S. was two years and seven months old. Excepting the deformity of the hand, no other abnormality is discovered. The father died of pulmonary tuberculosis; mother, though anæmic and weak, does not give any tubercular or specific history. The other children are well formed. No history of a similar malformation on either maternal or paternal side.

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*Read by title.

At birth the index and middle fingers of the affected hand were distinctly larger than those of the other side, and it is my impression that the hypertrophied fingers have increased more rapidly in size, relatively to the growth of the normal parts, during the past eighteen months.

The abnormality begins just below the metacarpal bones of the index and middle fingers of the left hand, the metacarpo-phalangeal joints being apparently in a normal state. The process seems to involve all the structures, the bony as well as the soft parts. As to motion, extension is not interfered with, on the contrary the distal phalanges can be hyper-extended. Flexion of the middle and distal phalanges is imperfect. In attempting to close the hand, the affected fingers rest upon the ball of the thumb.

Congenital Hypertrophy of the Fingers at 2 yrs. 7 mos (Reduced ½.)

Voluntary lateral motion also defective. The structures are hypertrophied and not simply œdematous. Sensation normal.

In Bradford & Lovett's work on "Orthopedic Surgery," hypertrophy of the fingers or toes of congenital origin is described as "a condition which is occasionally encountered, but which is extremely rare. It is, perhaps, noted at birth that one digit is larger than the rest, and with the growth of the hand, the abnormally large finger remains proportionally the same, growing more rapidly than the other fingers. It is hypertrophy of all the structures, although sometimes more marked in the muscular and areolar tissues than in the others. The arteries going to these fingers are larger, and the temperature higher than in the normal fingers."

No treatment short of amputation can be recommended. Continued compression has not been followed by success. Ligation of the arteries has been resorted to, but thus far, no successful case has been reported.

In *Med. News*, Mar. 17th, 1894, Prof. Morton reports two cases, the first of which (excepting in my case there is no webbing of the diseased fingers) is almost a counterpart of the one now presented. The involved

portions were amputated and a large pad of fibro-fatty tissue was dissected out from the palm.

The second is not a pure case of hypertrophy, as the bones are not involved and is furthermore complicated with a cavernous angioma. The left forearm is grooved probably from pressure of amniotic bands. Elastic pressure with ichthyol lanolin (10 per cent.) has benefitted the case a good deal.

In this same number Dr. G. E. Shoemaker reports a similar condition in the foot also operated upon and greatly improved.

THE SYMPTOMS OF INTESTINAL OBSTRUCTION, WITHOUT STENOSIS.*

BY HENRY DWIGHT CHAPIN, M. D.,

New York.

E. G., four years, female, was healthy until an attack of scarlatina in her second year. This was shortly followed by an attack described by her mother as follows: On Nov. 19, 1891, she had fever and complained of pain in the back, wishing it rubbed. The fever subsided the following day, but toward evening it was noticed that she could not walk, and shortly afterward was unable to raise her hands. The head was retracted, there was rolling of the eye-balls and an excited mental condition. She would have screaming spells during which the hands were raised to the head, and she likewise complained of sensitiveness in the extremities. There was retrogression of the paralysis at the end of second week, and she slowly recovered the use of her hands and arms. By Christmas she began moving her toes, and gradually acquired a partial use of the legs, but not enough to walk. This condition remained stationary until April, 1892, when a severe attack of measles appeared to make the legs worse. Following this there was little progress, and braces were applied to the legs to try and aid locomotion. The child, from the beginning of her illness, was troubled with most obstinate constipation and in-

*Read by title.

dustriously plied with many drugs and quack medicines for its relief. In spite of heroic medication, she would often go several days without a movement of the bowels. On June 8, 1893, she was brought to New York and placed under Dr. W. J. Morton's care for the treatment of the paralysis. As an examination during the treatment showed that the prepuce was adherent to the clitoris, it was thought best to remove such a possible source of irritation, and accordingly a small quantity of ether was given and the preputial adhesions broken up on June 21st. The following day, which was intensely hot, seemed to have a bad effect on the child and the mother reported that there was constant vomiting with much depression. She was unable to keep anything on the stomach during the night, and on June 23d was in a condition of extreme prostration from inability to retain any nourishment. Dr. Morton then called me in consultation, and, after a careful examination, we concluded the case must be one of acute gastritis, aggravated by the prevailing heat. The bowels had acted on the previous day, but still nothing could be retained by the stomach. As we were leaving the house, the mother recalled us, as the character of the vomited matter had changed. Upon reaching the room we found the child in the act of vomiting a dark-colored material, evidently the contents of the small intestine. Another careful examination of the abdomen showed no evidence of tumor, but digital exploration showed the rectum to be ballooned up in a way that is supposed to signify intestinal obstruction. Immediate efforts were made to reduce a possible obstruction by the passing of an intestinal tube and free flushing of the bowel with water. No fæcal matter came away with the enemas except some small prticles in the lower bowel. The dark-colored vomiting continued and appeared to be the products of pancreatic digestion, with no distinct fæcal odor. The irrigation was continued through the night, and every effort made to keep up strength by concentrated nourishment given by the stomach and small nutrient enemas, but neither were long retained. On the following day (June 24th) Dr. Kelsey was called in consultation, but, as the child was exceedingly weak, and no tumor could be detected, decided against a laparotomy. The pulse ranged from 150 to 160, and the temperature varied between 103° F. and 104° F.

High intestinal irrigation still failed to bring away any fæcal discharges, and the dark-colored, feculent vomit-

ing continued. These symptoms continued until the following day, when she died from exhaustion. An autopsy made a few hours after death showed the small and large intestine without any obstruction, except a very slight ante-mortem intussusception in the ileum. The large intestine was fairly empty, and the small intestine in much the same condition except in its upper part, where the thin dark-colored matter that had been so repeatedly vomited was seen. The stomach presented marked signs of gastritis. It was evident that the extreme and continued vomiting had induced retro-peristalsis in the adjacent part of the small intestine. The inability to produce a fæcal discharge by our injections was explained by the emptiness of the large bowel. All the symptoms of intestinal obstruction, except a tumor, were present. Obstinate constipation, with ballooning of the rectum and repeated fæcal-like vomiting, with extreme prostration and death. Dr. W. W. Keen has reported a case* in which he performed a laparotomy for apparent intestinal paralysis which caused arrest of the intestinal contents and was equivalent to intestinal obstruction. The patient was an adult female suffering from repeated vomiting, sometimes lasting for an hour at a time, with fetid breath, obstinate constipation not relieved by injections, and great prostration. Upon operation he found that from the middle of the small bowel down to the ileo-cæcal valve the lumen of the bowel was diminished to less than one-half the calibre of the upper portion, whereas the large bowel was dilated very greatly with gas. Neither the constricted half of the small bowel nor the dilated large bowel contained any fæcal matter. The distended large bowel was relieved of its tension, peristalsis became re-established, and the case went on to recovery.

*American Surgery and Gynæcology, June, 1893.

TONSILLOTOMY FOLLOWED BY DIPHTHERIA AND CROUP.

REPORT OF A CASE, WITH SUGGESTIONS AS TO THE PREVENTION OF SUCH GRAVE COMPLICATIONS.

By AUGUSTUS CAILLE, M.D.

Professor of Pediatrics in the Post Graduate Medical School and Hospital, New York.

THE basis for the present communication is given by the following unique case which came under the writer's observation recently. A boy four years of age was brought from a suburban town to the writer's office for the removal of hypertrophic tonsils which for two years past had given rise to the usual symptoms and had been particularly troublesome owing to frequent attacks of acute tonsillar inflammation. On digital examination of the naso-pharynx adenoid vegetations were also detected and the gums were found to be somewhat swollen in consequence of carious molar teeth in an advanced state of decay.

In all similar cases it has been my practice to have all carious teeth extracted or filled before cutting away the tonsils and to irrigate the naso-pharynx and buccal cavity for eight days with a mild antiseptic solution before operation.†

In the present case, however, the tonsils were removed at once, without preparatory prophylactic treatment, as a matter of convenience and by request of the parent whose home was some distance from New York.

Both tonsils were removed in the usual manner with a disinfected tonsillotome and the parent was instructed to pour into each nostril a teaspoonful of dilute Labarraque's solution (1-20) every two hours and to give internally a teaspoonful of saturated solution of chloride of potassium every hour, as the boy was not able or willing to gargle.

†Vide Caillé, Prophylaxis in Diphtheria. *The Medical Record*, Feb. 18, 1888.

On the next day the boy was violently sick and was seen by me in consultation in the following condition: The stumps of both tonsils were covered with a dense pseudo-membrane which also extended over a portion of the anterior arch of the soft palate where the shield of the Tiemann-Fahnenstock tonsillotome had evidently produced an abrasion of the mucous membrane which is quite often unavoidable. The entire pharynx was intensely hyperæmic; bilateral submaxillary glandular swelling was pronounced and a high temperature and general prostration were present together with other troublesome symptoms, such as vomiting and cerebral unrest. A swab culture taken from the pseudo-membrane and one from the carious teeth and gums revealed bacilli and streptococci (mixed infection.) Nasal irrigation was continued and a spray of mercuric bichloride solution (1-5000) was directed into the mouth and pharnyx every half hour and additionally a mixture was administered internally every hour, each dose of which held $^1/_{32}$ grain mercuric bichloride and three drops of the wine of ipecac.

In the evening of the same day the patient's condition was about as pictured above, but it was noticed that the voice had become husky and hoarse—there was no cough at the time.

On the following morning an examination showed no further extension of the pseudo-membranous affection except a small streak of diphtheritic deposit on the posterior pharynx, whereas the membrane on the anterior arch of the palate had well nigh disappeared, on the other hand a croupy cough was well marked, also slight stenotic breathing. By pressing the base of the tongue well down the epiglottis could be seen and was found to be highly congested. Twelve hours later the posterior surface of the epiglottis was found covered with a thin deposit and the laryngeal stenosis had increased. On the following morning I performed intubation for the relief of the now dangerous stenosis. After the introduction of the tube which was promptly followed by complete relief as regards the symptoms of obstruction, the internal ad-

ministration of mercuric bichloride was discontinued. The use of the spray was kept up and the naso-pharyngeal toilet was continued with a saturated solution of boracic acid. From this time on the pseudo-membranous inflammation gradually abated and four days after the introduction of the tube, noticing a purulent discharge from the same, I removed the tube under the supposition that its further use was contra-indicated because experience has taught me that, with the onset of a purulent tracheitis or bronchitis after intubation, the tube is no longer required and the danger of suffocation, especially as regards older children, is practically over.

This assumption proved to be correct in the case under consideration, notwithstanding the fact that the pseudo-membranous deposit on tonsil and pharynx remained visible for a few days longer.

After the tube had been removed, forced feeding and stimulation soon showed good results, and the boy made a rapid and complete recovery, the usual hoarseness of voice which is noticeable after intubation disappearing in about two weeks. Two weeks after the favorable termination of this case I had the carious teeth extracted or filled after which a swab culture was made with negative results, and three weeks subsequently I removed the adenoid vegetations with Gottstein's curette. The naso-pharyngeal toilet or irrigation was kept up during this time by means of Birmingham's douche.

The boy will continue to receive a teaspoonful of salt water into each nostril morning and evening, and I am confident that as long as this practice is kept up he will not again be in danger from diphtheria of the nose and throat.

It is evident that the direct causative factor for the development of diphtheritic inflammation in our case must be sought in the production of a wound surface by tonsillotomy in an infected mouth and pharynx. In fact, it is a well-known and ordinary experience to find local inflammation and the formation of a pseudo-membrane following operations on the nose and throat and occasionally in the buccal cavity.

Such grave sequelæ following tonsillotomy have never before been observed by the author and present a unique case in a rather large experience.

The prophylactic measures necessary to prevent such grave complications are embodied in the author's communications to the New York Academy of Medicine in 1888, to the American Pediatric Society in 1889-90, and to the Tenth International Medical Congress, Berlin, 1890, where it is asserted that many persons harbor the diphtheritic poison or microbes essential to its formation, and septic power in their nasal and oral cavities and in decayed teeth most of the time without damage to the organism, but as soon as the natural protective surface of a mucous membrane is removed rapid infection is the result.

The proof of such assertion has subsequently been established by bacteriological research.

Chantemesse found diphtheritic bacilli in the pseudomembranous plaques incident to tonsillotomy in 1891. Sallard found streptococci and staphylococci in the plaques following amygdalotomy. Sendtner found streptococci in angina follicularis. Kurth found streptococci in acute tonsillitis and scarlatinal angina, and in 8 per cent. of all cases found streptococcus pyogenes in healthy mouths, and E. Doernberger, of Munich, reports as the result of careful inquiry that he has found the streptococcus in the pharynx of many healthy individuals, and recommends ichthyol as a local antiseptic and prophylactic remedy.

In the New York Medical Journal of December 23, 1893, Drs. Biggs and Parke of the New York Health Board report the finding of diphtheria bacilli in the mouths and throats of persons recently sick with diphtheria; 405 cases were investigated—in 245 cases no bacilli were found 3 days after recovery. In 103 cases the bacilli were found 7 days after recovery, in 34 cases after 12 days, in 16 cases after 15 days, in 4 cases after three weeks and in 3 cases after five weeks. In these persons all local and constitutional manifestations were absent whilst they harbored the contagium of diphtheria and were a

source of great danger to those about them. The above investigators also report that in this connection an interesting observation has been made that in diphtheria cases which have been subjected to frequent irrigation with antiseptic solutions from the beginning of the disease the bacilli disappear far more rapidly than in those in which such irrigations have not been employed.

Drs. Booker, of Baltimore, and Koplik, of New York, have also published important contributions to the knowledge of our subject (*vide* Transactions of the American Pediatric Society.)

Such bacteriological investigations confirm the writer's conclusions of 1888 which have been reported to this Society in 1889 and 1890, which are embodied in the following resume of our subject:

1. In the present state of our knowledge the possibility of preventing diphtheritic infection of the naso-pharynx cannot be denied.

2. The Municipal control of diphtheria in large cities is inadequate and methods of personal prophylaxis are more apt to prevent infection.

3. A daily toilet of the naso-pharynx by means of weak antiseptic solutions is a trustworthy method of prevention in the absence of filthy carious teeth and enlarged or inflamed tonsils and adenoid vegetations.

4. The naso-pharyngeal toilet is indicated for all those who are exposed to diphtheritic infection and as a routine treatment in every case of naso-pharyngeal catarrh, pertussis, scarlatina, measles, and before removing tonsils and adenoid vegetations to prevent diphtheritic infection as a complication.

5. The following solutions may be employed:

Weak salt solution.

Boric acid solution, 2 per cent.

Labarraque's solution, 1 to 20.

Bichloride of mercury solution 1-5000.

Weak (rose colored) permanganate of potassium solution.

Lime water.

6. In a case requiring tonsillotomy in which filthy carious teeth and adenoid vegetations exist at the same time, the carious teeth should first be extracted or filled, and the naso-pharynx should be irrigated for a week previous to operation, and it would seem advisable to ascertain by means of a swab culture the presence or absence of diphtheria bacilli before operating on tonsils and on adenoid vegetations.

DISCUSSION.

Dr. Abraham Jacobi, of New York City, said that the precautions given by Dr. Caillé would be forgotten unless they were hammered into the heads of the members of the profession over and over again. There was not a more forgetful class of people than physicians. The reason for this might be that, medical literature being so voluminous and so much of that appearing in the medical journals being hardly worth reading, it was difficult to select and retain what was worth retaining.

The subject of the paper was in his opinion one of the most important in the treatment of children's diseases. He hoped that the gentlemen present would go forth as prophets of a doctrine which to some might be new, but which to others would certainly be very old. He had been teaching for thirty years that wherever there was a wound, diphtheria was near; the germs were everywhere, and hence where there was a wound, there they might find a nest. It was in this way that in former times, amputation and hare-lip wounds became diphtheritic, because they were not treated antiseptically, and the proper precautions were not taken. During the presence of diphtheria in a community, no wound should be made and the tonsils should not be exsected if it were possible to postpone the operation until after the epidemic. He had seen the wounds of exsected tonsils covered with a film of membrane, or with a thick membrane, hundreds of times, and a score of times had he seen general diphtheria as a result of the exsection of a tonsil in children who, if let alone, would probably have escaped the disease. In a few cases, fatal laryngeal diphtheria had been the consequence. What he had been teaching and writing on the subject had been apparently forgotten until Dr. Caillé had taken it up. Very few physicians cared about it, and very few parents knew about it. It was time that it should be remembered.

Dr. H. Koplik, of New York City, said that the paper

was in direct line with his article in the *New York Medical Journal* upon acute lacunar diphtheria of the tonsils.

The tonsils in this affection harbored in the depths of the lacunæ a large number of virulent Lœffler bacilli. He would point out more especially the fact that children with large tonsils were especially prone to get up attacks of diphtheritic lacunar amygdalitis. In the depths of the lacunæ, and not on the surface of the tonsils, virulent diphtheritic bacilli are found. He suggested that before an operation on the tonsils was undertaken, a plug extracted from the depths of a lacuna with a sterilized scoop should be examined. In twenty-four hours one could tell in this way whether to operate or not. If diphtheria resulted after tonsillotomy, it was because the diphtheria existed in the tonsil at the time of the tonsillotomy, except of course where the patient had been subsequent to the operation exposed to diphtheria. It was just like operating on a prepuce on which there was a chancroid; the chancroid would involve the whole wound. As soon as the tonsil was cut, the membrane spread from the lacunæ over this fresh bloody surface, which formed a favorable culture medium for the bacilli. The reason the children were comparatively safe if not operated on, was that the diphtheria bacilli diminished in virulence as long as they remained undisturbed in the lacunæ, and were bathed in the lymph and leucocytes there present. He had himself proved that non-virulent bacilli replaced the virulent form after a sojourn of several weeks in the tonsil. If diphtheria were found in the tonsil, tonsillotomy would have to be postponed until repeated culture tests showed the bacilli to be no longer present. This would at least give the patient the benefit of a scientific method of diagnosis. The fact that there was a diphtheria epidemic present should not defer the proposed tonsillotomy, provided that the operator was sure that the throat of the patient was healthy. We knew from bacteriological investigation in the laboratory that if the diphtheria bacilli were not put almost directly on the surface, there could not be an infection. If it were unwise to perform tonsillotomy during an epidemic of diphtheria, we certainly should not operate on the vagina or conjunctiva.

Dr. Dillon Brown, of New York, said that he agreed fully with Dr. Caillé as to the importance and necessity of the naso-pharyngeal toilet before and after operation; but he called attention to the fact that in a certain number of cases the use of lotions was impracticable, owing to the objection of the child or of the parents. He would

recommend in such cases the use of antiseptic vapors, especially the fumes of subliming calomel, as a means of disinfecting the pharynx preparatory to operation, and to prevent the extension of a naso-pharyngeal diphtheria to the larynx.

Dr. A. Jacobi opposed the view expressed by Dr. Koplik, that an almost immediate contact with the diphtheria germ was necessary for a wound to be infected. The meaning of the expression "an almost immediate contact" could be stretched very considerably, and it lacked the accuracy which was always expected from Dr. Koplik. We knew that diphtheria would spread over a room or house where no kissing had been going on, and where there was no reason to assume that anything but a current of air had conveyed the germs. His warning, therefore, about postponing such operations whenever possible still held good.

On the other hand, he had been agreeably surprised at the results of bacteriological research during the last few years. For more than thirty years he had been teaching that a large number of cases of lacunar amygdalitis were diphtheritic, and the profession had been laughing at his "overdoing things." It was now well known that a great many, if not most, of the cases of follicular amygdalitis were really diphtheritic. He was glad to hear that truth again from one like Dr. Koplik, who was so thoroughly capable of judging, and to have another proof of the fact that accurate observations could be made before the era of bacteriology.

On behalf of those who were mainly clinicians he would say that careful clinical observations might nevertheless be accurate, though they were only clinical. It should not be forgotten that whatever was known in medicine up to a certain time was clinical in its origin; and really there was no conflict between clinical observation and laboratory observation, for both led to the same results. As practitioners, we should not forget that while we were under the greatest obligations to the bacteriologists, we needed to be as accurate as ever in our clinical observations.

Dr. Fruitnight said that while bacteriological examinations had made exact diagnosis in diphtheria possible, this very exactitude had become a source of some danger. For the absence of the Klebs-Lœffler bacillus did not prove the non-existence of diphtheria. He believed it was not necessary for the bacilli to come into direct contact with the wound, but to come within the radius of the

bacillary atmosphere would be sufficient to originate the infective process. He had recently seen a very abundant deposit of true diphtheritic membrane in a person who had not been near a diphtheritic patient. He would even go so far as to say that every child should be subjected to prophylactic treatment, whether exposed to diphtheria or not, for the very reason that it was not always necessary for the germs to come in immediate contact with the part.

Dr. Rotch did not believe that so much had been forgotten as Dr. Jacobi had implied, but that the medical profession did not jump at conclusions as it used to do. Over and over again clinical views had proved to be wrong. He thought the clinical observations of Dr. Jacobi had great weight all over the country, and all over the world, and that the proper precautions were now being taken in many places. In Boston, if a physician had a case of doubtful amygdalitis, he could procure sterilized tubes and platinum wire from a special laboratory, and have a bacteriologist at his service at certain hours every day. This opportunity was taken advantage of constantly and within twenty-four hours the physician was in possession of the desired information. The speaker then cited the case of a baby of nine or ten months, who, in common with the other members of a household in which there was an undoubted case of diphtheria, had cultures made from the throat, and in whose throat the Klebs-Lœffler bacillus was found. This baby's throat was swabbed out, and it did not get diphtheria. The examination was made by an expert, and there was no danger of the Klebs-Lœffler bacillus having been introduced into the throat.

Dr. Jacobi said that it was just at the age of this baby that diphtheria did not develop so readily. Babies under one year who had diphtheria, were generally less than three months old. They were protected by their oral secretion, which was acidulous rather than alkaline. Still, he believed that the baby referred to by Dr. Rotch was saved by the antiseptic treatment.

Dr. Caillé, in closing the discussion, expressed his appreciation of the valuable suggestions made by Dr. Koplik regarding the examination of a plug from the crypt of the tonsil, and of that made by Dr. Brown about the use of calomel fumigation in proper cases. In a communication made in 1888, and in another in 1889, he had called particular attention to the clinical observations of Dr. Jacobi, and had stated that they were the basis of his reasoning and experiments. He had simply been attempt-

ing to aid Dr. Jacobi, and had found it up-hill work. The tardiness of the profession to accept the facts that we could not differentiate at the bedside infectious and non-infectious throat infections, and that it was dangerous to wound the mucous membrane of the nose, naso-pharynx and throat in the treatment of such affections was remarkable.

His paper had treated only of the prevention of diphtheria after tonsillotomy, and not of the prevention of diphtheria in general; still, he would say a few words in regard to the latter. It was the duty of the physician, as he entered a household, to examine the children, and to call the attention of the parents to carious teeth, adenoid vegetations, and enlarged tonsils with their dangerous contents; and to advise proper measures for the removal of such dangerous conditions. And then, if the naso-pharynx were kept clean by simply pouring into the child's nose a non-irritating antiseptic solution, the physician would have done his best to prevent diphtheria. This was the position we must take if we would not be behind the times.

CONGENITAL PULMONARY STENOSIS (CONUS ARTERIOSIS)—INCOMPLETENESS OF SEPTUM VENTRICULORUM — CYANOSIS — ABSCESS OF BRAIN—DEATH AT FOUR AND A HALF YEARS (SPECIMEN SHOWN).

BY WILLIAM P. NORTHRUP, M.D.,

Attending Physician New York Foundling Asylum and Presbytertan Hospital, New York.

This case is of interest because it is uncommon, because it corresponds exactly to the descriptions in the books, because it was long and carefully observed, and because the autopsy completes the history so satisfactorily as to make it of service for future reference.

It is a case of early fœtal endocarditis constricting the conus arteriosis. All the other changes obviously were due to nature's effort to compensate. The endocarditis, too, must have been early in development before the septum was completed, so that nature could elect the very best point to effect a compensating circulation. Since the right ventricle could not discharge all its blood into the lung artery, it was allowed to hypertrophy, force as much as possible through a narrowed pulmonary orifice and spill the remainder over into the high-pressure stream of the left ventricle, discharging into the systemic circulation.

How well this heart succeeded in overcoming the embarassment will be understood when it is noted that it did its work for four and a half years, carried the patient through measles and whooping-cough and was overwhelmed at last by so heroic a disease as abscess of the brain and repeated convulsions.

The patient was a boy four and a half years old, an inmate of the New York Foundling Asylum, known familiarly by the name of "Hearty." He was good-natured, phlegmatic, flabby, in fact looked like a fat, lazy, overfed boy. He looked puffy; had, as some one remarked, a "boiled look." His features were shiny, with a queer mixture of pallor and cyanosis. His cheeks were pale claret-color, his lips and fingers dusky. His nose was rounded at the end, his digits knobbed, his belly prominent—in fact he always looked as though he had just eaten all he possibly could hold and could scarcely breathe from it.

The above was his condition when he was in his best form. When he really had just eaten, his dyspnœa and cyanosis began in earnest.

Now he moved about cautiously, with a self-absorbed expression, made for the corner of his ward, put his hands on his knees, bent forward and rested his head in the angle of the walls, there remaining till his oppression was relieved. Three or four times a week he had attacks of dyspnœa of a severe type. At such times he went into a semi-comatose state, gasping, tossing his arms and legs, rolling about, his cyanosis then being of the marked, characteristic, metallic hue. Yet, we remind you, he passed creditably through whooping-cough and measles, and finally died at four and a half years of an intercurrent disease.

Physical Examination of the Heart.—A fine wave at left third interspace. Soft purring thrill over base. Apex beat half an inch outside of left nipple line. Cardiac dullness extended from right sternal margin to left nipple; no dullness to right of sternum. A loud, harsh, systolic murmur heard along the left margin of sternum, but distinctly and definitely marked at second left interspace and third rib. Murmur not transmitted to left nor along the aorta.

The second heart sounds at base were thought, at first examination, to be absent, at another time to be present, though very weak.

Liver and spleen somewhat enlarged.

Autopsy.—Right ventricle markedly hypertrophied, tilting the heart to left, apex being outside nipple line and no part lying to right of right sternal margin. Aorta distended, larger than normal, pulmonary artery rather smaller than normal. Comparison of two in situ made the disproportion between them seem greater than it really was. Ductus arteriosus impervious, foramen ovale practically closed. A small slip persisted, covered by semilunar fold which seemed ample protection.

Left Ventricle.—Normal.

Right Ventricle.—Walls thicker than left, septum incomplete at auricular end, conus arteriosus constricted, opening one-half c. m.

A probe could not readily be passed from pulmonary artery into right ventricle because, as afterwards ascertained, the pulmonary orifice was at right angles to the axis of the artery, and small. On the other hand the little

finger could be passed from either ventricle into the aorta, as subsequently learned, through the aperture in the septum. Pulmonary artery was abnormally small, aorta abnormally large. Conus arteriosus was practically obliterated. Pulmonary orifice was from the ventricular aspect, a pouting ring half a centimetre in diameter, of white cicatricial tissue and, as has been said, at right angles to the axis of the artery.

There is a suggestion of the apex of the conus between the constriction and the valves at the beginning of the true artery.

The anatomical history is a fœtal endocarditis taking place before the forming septum between the ventricles had advanced from the apex to the auricular junction. The endocarditis caused constriction of the conus and the stream of blood from right ventricle to left kept the septum open. The aorta, receiving a direct stream from both ventricles, was distended; the pulmonary artery, receiving but little, remained small. At this point, too, appears the reason why the pulmonary valve closing gave a very weak second sound, or at another time, when the heart was working quietly, gave no sound.

What was the cause of the murmur, harsh and loud, at the second space and third rib on the left? Was it blood rushing past the annular, fibrous opening of the pulmonary orifice? Was it a commingling of the two blood streams just belowthe beginning of the aorta?

It would seem that it might best be a pulmonary murmur. From its location, from there being no transmission up the aorta, none to the apex and to the left, from the anatomical findings, the sharp fibrous ring past which the blood was driven by an hypertrophied muscle, we are inclined to this belief.

At the outset we said this case conformed most satisfactorily to the classic teachings—as a case of congenital cyanosis.

It lived more than two years. By far the largest majority that live more than a few months are of this very description, viz: Stenosis of pulmonary orifice or artery with compensating communication through the ventricular septum. (See writings of Professors J. Lewis Smith and Osler). The hypertrophy was of the right ventricle. If it had been of the right auricle, the hypertrophy might well have been expected to give dullness to the right of the sternum and downwards to the xiphoid. Moreover, the rythm of the heart and its force, when working tranquilly, were of good quality.

This case came under the observation of numerous attending physicians, Dr. O'Dwyer being the one in whose service it finally died. This report is made with his consent and includes his observations.

TWO MIRROR WRITERS.

BY GEORGE N. ACKER, A.M., M.D.,
Washington, D.C.

I desire to present to the society these two boys who from the time they first learned to write have written in the style termed Mirror-writing ; because like the impression of a letter taken upon blotting paper it can be most easily read by those not used to it, in a mirror where the reflected image takes the appearance of ordinary writing. Though this can be acquired by any one after practice, yet it is found only in left-handed children, or in adults after right-handed paralysis.

CASE I.—N. A., male aet. ten years, mulatto, was prematurely born at about the eighth month. For the first weeks of his life he hovered between life and death, but finally attained a fair standard of health. Upon the least suspicion of sickness he would be thrown into convulsions. When about two and a half years old he fell the distance of fourteen feet upon a bed of concrete. The skull (right frontal region) was exposed for four inches without fracture. From the moment of the fall he was entirely conscious and responded intelligently to any questions put to him, but never once cried even when the stitches were put in. From that time on the convulsions were stronger and oftener. Three years ago he developed chorea, and medicine having little effect I circumcised him two years ago for phimosis. The operation appeared to do him good for a time, but the chorea returned in more severe form and still continues. His intelligence is as good as the average child's, and he is crafty. At one time it seemed as if he would develop into a kleptomaniac, but is only so, now, at intervals. He is of a mild and docile temperament, but has very little to say and responds usually by a nod of the head. His parents control him with difficulty, and it is necessary to keep a strict watch over him.

Naturally left-handed, his first formation of words was what is called Mirror-writing, but by insisting on his using his right hand he now writes with equal dexterity with both in four different ways. The father is a nervous man, and does not talk plainly, but is well educated. The mother has tuberculosis of the lungs. Mother's father and mother both lived to old age. One maternal uncle insane. One sister died of diphtheria. Three brothers in good health.

CASE II.—Harry O., black, male, aet. nine years: Boy not bright. Mother does not trust him away from her. Does not talk plainly. Had convulsions during first year of life. Has not been a sickly child. The incisor teeth are notched. The child has always been left handed, and only writes mirror-writing. Father and mother in good health, but of low order of intelligence. Two sisters of fair intelligence and one brother aet. eighteen years almost an idiot.

There is a physiological tendency for left-handed children to fall into mirror-writing. W. W. Ireland states that sixty school children were told to write left-handed. Two girls and three boys wrote in mirror-writing. These were found to be the only left-handed children in school. One hundred and thirty-four of the junior division were told to write with their left hands. There were six left-handed children, and three wrote mirror-writing.

Dr. Erlenmeyer in his interesting pamphlet on the physiology and pathology of writing, observes that it seems to be easier to use the arms in a centrifugal direction, the left from the right and the right from the left.

There are numerous cases on record where mirror-writing has followed disease of the left side of the brain. Leonardo da Vinci was a notable example of this, though his case was not recognized until recently. Cohen-Bruch says that the earliest recorded case was in 1688 in an epileptic girl twenty-one years of age.

INFLUENCE OF VENOUS CONGESTION ON SPINAL REFLEX CENTRES.

BY B. K. RACHFORD, M.D.,

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I have elsewhere[1] called attention to the fact that those chronic diseases which produce the most marked reduction in the nutritive elements of the blood are among the most important indirect causes of the neuroses of childhood. That these neuroses are associated with the profound anæmias produced by disease of the blood-forming organs there can be no doubt; but the question may well be asked, is the anæmia alone responsible for the irritable condition of the nervous centres? Is it simply a question of chronic malnutrition of the nervous centres, or is there some other blood change besides the simple anæmia which is in part responsible for the hypersensitiveness and instability of nervous centres which results from the chronic anæmias produced by such diseases as tuberculosis, rheumatism, malaria and syphilis? While this paper has no such ambitious aim as the solution of this difficult question, it does attempt to contribute something which may be of value in the study of this important clinical problem.

For the purpose of classification we may say that there are three important blood changes which are etiologically related to the neuroses of childhood. They are:

1. Toxines in the blood.
2. Simple anæmia, acute and chronic.
3. Venous congestion,[1] acute and chronic.

The above-named blood changes do not as a rule exist as separate pathological conditions; they should rather be considered as factors of that complex blood condition which has much to do with producing the excitable con-

[1]Tuberculous Neuroses of Childhood, *Archives of Pediatrics*, May 5, 1893.

dition of the nervous centres, that is associated with the the chronic anæmias of childhood. The above classification therefore is given only that it may furnish an outline for discussion.

In discussing the influence of venous congestion on the spinal reflex centres, it will be necessary, because of the close relationship and common existence of the above named blood conditions, for me to touch briefly on the influence of toxines and of arterial anæmia on the excitability of nervous centres.

It has been demonstrated that toxines which are formed in the body and are carried by the blood can produce most profound nervous symptoms, and this fact finds ample corroboration in the every-day practice of medicine. For it is now a fact quite accepted in clinical medicine, that the nervous symptoms in cholera infantum, diphtheria and other diseases of microbic origin are in part due to the direct action of toxic agents on the nervous system. But notwithstanding the fact that we know that bacterial poisons can produce nervous symptoms, yet very little attention has been given to the possible action of these poisons in producing the neuroses that result from such chronic microbic diseases as malaria and tuberculosis. But without further discussing this part of the subject I will only note the fact that toxic bodies of microbic origin can produce nervous symptoms and may therefore be of etiological importance in the neuroses of childhood which are associated with chronic microbic disease.

In this connection it must also be noted that there are other toxines, *not* of microbic origin, formed in the body which can produce nervous symptoms. In a recent paper published in the *Medical News*[1] I demonstrated that paraxanthin, a poisonous leucomaine of the uric acid group, was an etiological factor in the production of a group of nervous symptoms which had heretofore been ascribed to uric acid. And in that paper I expressed the belief that not only paraxanthin, but also the other poisonous leucomaines of the uric acid group, either from a perverted meta-

[1] Etiology of chorea, *Phil. Med. News*, April 22, 1893.

bolism or a diminished excretion, might occur in such abnormal quantities in the blood as to be a cause of nervous disease.

Let us now pass to the consideration of the influence of simple anæmia, acute and chronic, on the nervous symptoms. I here limit the term *simple anæmia* to mean a simple blood impoverishment, a quantitative reduction in all the nutritive elements of the blood. It is my opinion that this condition of the blood can be best brought about experimentally in animals either by repeated bleedings or by starvation, or by both. We also have in the complete or partial closure of arteries a means of diminishing or entirely shutting off the arterial blood from nervous tissue. But it seems to me that the nervous symptoms resulting either from wholly or partially shutting off arterial blood from the nervous centres by this method cannot be said to be entirely due to lack of sufficient nourishment, or in other words, to a simple anæmia; the venous stasis which must result from the complete or partial shutting off of the arterial blood will also no doubt have an influence on the irritability of the nervous centres. And it should also be noted that the symptoms resulting from a complete anæmia, whether produced by violent hæmorrhage or complete ligation of arteries, cannot for a moment be thought to be due to lack of nutrition alone. Here we have a sudden interruption not only of the exchange of nutriment between the blood and tissues, but also of the exchange of gases and of all the effete products of tissue metabolism. For these reasons I concluded that the best method for studying the influence of simple anæmia on the nervous centres was by repeated bleeding or by starvation, or by these two methods combined. Following out this idea I starved and bled a number of rabbits into a condition of profound malnutrition. The rabbits were given all the water they would take and as little food as possible consistent with life. By this method rabbits were kept for two or three weeks in a state of profound malnutrition before they finally starved to death, and it was found that this condition had very little influence on their nervous

systems. After two weeks of starvation the spinal reflexes were somewhat exaggerated and the electrical excitability of the muscles of the hind legs was diminished. These results were not in keeping with my preconceived ideas of the influence of simple anæmia on the nervous centres. In a number of other papers, previously referred to, I had shown that the most pronounced nervous symptoms, including all the so-called neuroses of childhood, were associated with the profound anæmias produced by such diseases as tuberculosis, rheumatism, malaria, and syphilis, and I had concluded that this irritable and unstable condition of the nerve elements was caused chiefly by the chronic malnutrition of the nervous centres resulting from the simple anæmia or simple reduction of the nutritive elements of the blood. But the results of my starvation experiments led me to suspect that the most important blood changes in tuberculosis, rheumatism, malaria, and syphilis might not be a simple reduction in the nutritive elements of the blood, but that the blood in these diseases, besides being reduced in nutritive value might also contain effete and poisonous products which would act as potent factors in keeping the nervous system in a state of chronic irritability and instability; and this opinion has been much strengthened by the nervous phenomena which I have observed to follow ligation of the abdominal vena cava in the rabbit.

March 3, 1894, at 4 P. M., I operated upon a large, strong, full grown rabbit, tying the vena cava below the renal veins. Before the operation I tested the spinal reflexes and got very slight response. At the same time I tested the electrical excitability of the muscles of the hind legs by means of a du Bois-Raymond induction apparatus attached to a dry battery, and found that the weakest current to which the muscles would respond was marked 10.2 by the index on the centimetre scale.

After the operation the rabbit was kept on the board for one and one-half hours, and during this time the electrical excitability of the muscles of the lower extremities was tested at frequent intervals, and was found to be

steadily increasing, till at 5:30 P.M. they responded when the index marked 12.6 on the scale; but during this time there was no increase in the reflex excitability of the cord.

March 6th.—The electrical excitability of the muscles of the hind legs has continued to increase till to-day the maximum was reached when the index marked 13.2 on the scale But the reflexes are not noticeably increased.

March 10.—The electrical excitability of the muscles has gradually decreased, till now the index marks 11.6 on the scale. Reflexes are not increased.

March 18th.—Electrical excitability of muscles same as at last note. The reflexes are to-day for the first time somewhat exaggerated.

May 18th.—Two months later; the electrical excitability of the muscles is now somewhat less than before the operation. It is now about 10. and sometimes less than this. But the *reflex phenomena are now greatly exaggerated;* they have gradually increased till now the slightest excitant will give a pronounced reflex; the reflex excitability is now so great that it is difficult to say whether there has been any increase in the reflex excitability of the cord during the past three weeks, but it may surely be said that this excitability has not diminished.

The above experiment is the most striking of my vena cava experiments and it clearly demonstrates that a most exaggerated reflex irritability of the spinal cord may be produced by ligation of the abdominal vena cava in the rabbit. But it is especially worthy of note that the reflex irritability of the spinal centres did not begin in this rabbit till the third week after the operation, and that from this time on for a period of six or eight weeks it continued to increase.

In the above experiment I have recorded from time to time the electrical excitability of the muscles of the hind legs. But I do not lay stress on these observations as indicating the condition of the spinal cord It is possible that this rapid increase in nerve muscle excitability following the operation may have been due to the changed

conditions of the nerves and muscles themselves, and not at all due to any change in the cord itself; but whatever may be the explanation of these phenomena, they are worthy of record as nervous manifestations resulting from the changed blood conditions due to ligature of the vena cava. And it should also be noted that the same nerve muscle excitability results from ligature of the abdominal aorta in the rabbit, but does not result from starvation; the nerve muscle excitability is an acute change coming on very quickly after ligature of the vein or the artery, and within a few days it commences to diminish and gradually returns to the normal. From these experiments the inference seems clear that the resulting nerve muscle excitability is not, at least, entirely dependent on the malnutrition of the parts involved.

Let us now return to the consideration of the exaggerated reflex irritability of the spinal cord which came on two weeks after the operation and gradually increased for six or eight weeks. In studying these phenomena it is necessary that we should know that similar reflex phenomena can also be produced by limiting the supply of arterial blood to the cord by the ligation of arteries. The arterial anæmia thus produced must, as previously noted, result in a compensatory venous congestion, and this in all probability is the reason for the similarity in the results obtained by the two methods, the ligation of arteries and the ligation of veins. If now we compare the effect produced on the spinal reflexes either by ligation of arteries supplying the cord, or by ligation of veins returning the blood from the cord, with the effect on the spinal reflexes produced by prolonged starvation, we find a striking difference; the exaggeration of the reflex phenomena produced by starvation is indeed very slight compared with the exaggeration produced by venous congestion or arterial anæmia. It seems, therefore, a fair conclusion that venous congestion and arterial anæmia do not act in producing an increase in the reflex excitability of the cord solely by malnutrition. There must also be an additional factor or factors to assist the malnutrition in bring-

ing about this result ; and these factors, before referred to in the beginning of this paper, may be found in the effete and poisonous products that result from tissue metabolism and which by reason of the venous congestion are kept in contact with the nervous tissue, instead of being carried off as they normally are when the circulation is not interfered with.

I would not here give the impression that these experiments in any way undervalue the nutritional element in the production of neurotic disease. On the other hand they add testimony to the accepted opinion that malnutrition is a potent factor in neurotic disease, in the fact that the reflex phenomena did not come on for some time after the vena cava was tied, but they also bear testimony to the opinion that there are other very important factors which materially assist malnutrition in bringing about this result. While it is not the purpose of this paper to apply these observations in the explanation of clinical phenomena, I cannot desist from suggesting that we have here a partial explanation of the way in which endocarditis and pericarditis may act in producing chorea, hysteria and other nervous conditions in children. And the fact that endocarditis is the most frequent pathological condition associated with chorea adds force to the opinion that the retarded capillary circulation in the nervous centre due to a weak heart is one of the factors in the etiology of chorea and the other nervous conditions associated with endo- and pericarditis.

I would not here imply that the feeble capillary circulation and consequent venous congestion are in such cases the only causes of the chorea. The rheumatism poison which caused the endocarditis would also cause considerable anæmia, and this impoverished condition of the blood would increase the irritability of the nervous centres, and then with the onset of the endocarditis the anæmia and consequently the excitability of the nervous centres would increase ; and when to this is added a venous condition of the blood in the nervous centres due to the feeble capillary circulation, we have no difficulty in understanding

that the effete and poisonous bodies in the venous blood might act as exciting causes in the development of chorea and other neuroses associated with endocarditis.

DISCUSSION.

Dr. T. M. Rotch said that the paper was very interesting, and brought out a great many points that should be discussed. He desired to endorse more particularly in a clinical way what Dr. Rachford had done so admirably and so scientifically. This paper was a step in the right direction. All must have noticed clinically the relation between the enfeebled circulation affecting nutrition and nervous disorders. The more we kept this in view in our clinical work, the better would we be prepared to treat these nervous diseases, especially chorea; but we should admit that there were other causes and other views.

The author had used the words "scrofula" and tuberculosis.". Scrofula had an absolutely indefinite meaning. It was used by a great many persons all over the world, and not always as synonymous with tuberculosis, so that it was better to omit it altogether.

In corroboration of the statement made in the paper regarding the production of nervous symptoms by an anæmic condition, the speaker mentioned the case of a nine months old baby which he had seen with another physician, who thought that the baby was idiotic, and that its life was not worth saving. The blood-count showed a little over 1,000,000; the hæmoglobin was twenty to thirty per cent., and there was evidently a grave form of anæmia present. The mental hebetude was dependent upon a nutritional cause, affecting the blood, rather than upon cerebral disease. By bearing the many good points in the paper in mind we would become better diagnosticians.

Dr. J. Henry Fruitnight, of New York City, said that the important point that the phenomena of malnutrition were not the direct result of the impaired blood supply—*the anæmia*—but rather of a toxine which *followed* this anæmia, explained to his mind a great many of these phenomena. He had recently seen a case of pure starvation in which the nervous symptoms had been very much aggravated, and in which it had not seemed that malnutrition could alone have been the cause. Some ulterior causes resulting from this malnutrition seemed to explain the symptoms.

THE EARLY DIAGNOSIS OF POTT'S DISEASE OF THE SPINE IN CHILDREN.

BY DILLON BROWN, M.D.

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THE importance of an early diagnosis can hardly be overestimated, for upon its early recognition is based the hope of a rapid recovery, the chance of avoiding the infection of other parts by the tubercle bacilli, and the prevention of deformity, of abscesses and of paralysis.

Pott's disease is a chronic tuberculous lesion of the vertebral bodies or, very rarely, of the intervertebral disks, and it follows the usual course of a tuberculous ostitis, only modified by the type of bone and its location. The kyphosis is the result of the softening and destruction of one or more vertebral bodies and the giving way of the column at that point. In severe cases secondary pathological changes occur in the capacity and the shape of the chest. Hypertrophy of the heart with valvular disease and narrowing of the calibre of the aorta are common.

This disease is essentially one of childhood, 90 per cent. of the cases beginning before the child is fifteen years old. It may occur at any part of the spine, the most favorable location as regards deformity being the cervical, the lumbar and the lower dorsal regions, and the least favorable being the mid-dorsal and the upper dorsal regions.

The most characteristic and constant of the early symptoms is the rigidity of the spine on motion—the result of the reflex spasm of the neighboring muscles in their efforts to protect the diseased vertebræ. Even before this period the patient has been languid, listless and unwilling to move much, and complains of being constantly tired. Early and important diagnostic symptoms

are the lateral deviation of the spine which is often present in cervical disease and almost uniformly in dorsal and lumbar involvement; and the characteristic evening elevation of temperature of from one to three degrees which accompanies all tuberculous lesions.

Another early symptom, not quite as constant as rigidity of the spine, is pain. It is persistent, usually symmetrical, and is relieved by rest and extension. It is most frequently experienced at the periphery of the spinal nerves and may be referred (in dorsal and lumbar diseases) to the epigastrium or umbilical region, to the skin over the ileum, groin, hip, knee, ankle, front of thigh, inner side of leg or foot, or to the ball of the great toe; (in cervical disease) to the back of the head, the shoulders and chest. Tenderness over the spine is rarely present and would indicate rather a functional neurosis or hysterical spine than a caries. Disturbances in the functions of other nerves may take place, according to the location of the disease, producing cough, dyspnœa with cyanosis, a peculiar grunting respiration, vomiting and troubles with the bladder and rectum. The peculiar "night cries" of ostitis, when present, are very characteristic.

The guarded character of all the movements is very striking, and the efforts of the patient to protect the spine from jars and other injury give him a very characteristic attitude, varying according to the location of the disease. *In standing*, the common attitude in cervical caries is that of a wry-neck; in lower cervical and upper dorsal the chin is elevated, throwing the head forward to balance its weight on the articular facets; and that portion of the spine directly below the seat of disease is abnormally straight or even curved forward, while there is a compensating curve in the lower dorsal region which may be so great as to suggest a kyphosis and a new focus of disease; in mid-dorsal caries the shoulders are elevated, unequally as a rule; and in lumbar disease the attitude is characterized by marked lordosis. When there is much psoas contraction the trunk is thrown forward and sideways to allow for the flexion of the thigh. *On sitting* the

cervical case supports its head or chin with the hands, resting the elbows on the knees or the edge of a table; and dorsal cases support the trunk by holding on to the thighs. *Stooping* is marked by a rigid and straight spine, the patient reaching the floor by bending the knees. The gait is peculiar, owing to the efforts to avoid sudden jarring, and the child walks with the spine rigid, more on the toes than the heels, with the knees slightly bent, and if a psoas contraction is present, the body is thrown sideways.

The diagnosis is usually not difficult after the appearance of the deformity, which is an angular projection of the spine at the site of the lesion. As the disease advances this projection becomes less of an angle and more of a curve; and in dorsal caries there is more or less secondary deformity of the chest, which often resembles the deformity of rickets and may be the first symptom noticed by the parents. This projection is a rigid curve which cannot be obliterated by any kind of manipulation.

In considering the kyphosis it should not be forgotten that there may be a normal projection of the sixth and seventh cervical and first dorsal and of the last dorsal and first and second lumbar. Also much fat may obscure a projection.

The formation of an abscess is not an early symptom, as a rule, but it may be the first sign noticed by the attendants. The tuberculous abscess is not accompanied by high temperature and much constitutional disturbance, and therefore its presence may not be detected until it has reached the surface or involved some important structure. It extends along the line of least resistance, usually the sheath of the muscles, and it may come to the surface at almost any point. The most common and characteristic abscess is the one which extends along the psoas muscle, but the pus may come to the surface at almost any point either near its origin or remote from it, or it may open into all sorts of places—the mouth, any part of the respiratory or the intestinal tract, the bladder, the spinal canal, some joint, the peritoneal cavity, etc., the symptoms depending on the location.

The paralysis is a common symptom, and, although not usually an early one, it has been observed before the appearance of deformity. It is a pressure myelitis, due in the vast majority of cases to a thickened dura consequent upon a pachymeningitis, rarely to the pressure of pus and debris in the canal, and almost never to the direct pressure of bone. The onset is gradual and is usually preceded by much pain in the abdomen and legs, and by muscular cramps. It is essentially a motor paralysis, but may be followed by partial paralysis of sensation. The deep tendon reflexes of the knees and ankles are exaggerated, and the bladder and rectum may be paralyzed in lumbar disease and towards the end of all very bad cases.

The foregoing sketch of the symptomatology of tuberculous vertebral caries is not intended to be exhaustive, but is presented as a frame-work by means of which a differential diagnosis may be made, thus helping us both to exclude Pott's disease and, what is more important, to exclude those diseases which are so often mistaken for it. In the great majority of cases it only requires that attention be drawn to the spine and a careful examination made to prevent an error in diagnosis; but in certain cases a most careful and skilful examination of the symptoms may leave the diagnosis obscure. For convenience of diagnosis the symptoms may be divided into several groups:

1. The essential symptoms of all cases of bone tuberculosis, which include the peculiar "night cries," the evening rise of temperature, and the languid, tired feeling with certain rather characteristic mental changes.

2. The constant symptoms of a vertebral caries, whether due to tuberculosis, syphilis, traumatism or the pressure of an aneurism or a tumor, which include the angular knuckle, the early lateral curve, local pain, the peculiar attitude and the rigidity of the spine due to reflex muscular spasm.

3. Those symptoms that are secondary to interference with the spinal cord or its nerves, which include the paralysis, peripheral pain, cough, dyspnœa with cyanosis,

grunting respiration, vomiting and trouble with the bladder and rectum.

4. Changes in the shape of the chest as the result of spinal deformity and secondary changes in the heart and aorta; and

5. Those symptoms which depend upon the presence of an abscess.

There are no symptoms in the first division which would be likely to lead us astray by overlooking a Pott's disease; but their presence in a certain case would be of the greatest advantage in aiding us to exclude other conditions. And this is especially true in such cases where we have undoubted vertebral caries, in distinguishing a tuberculous one from a syphilitic or traumatic one, or in excluding that large class of cases in which a deformity not depending upon tuberculosis may be present. It should not be forgotten, however, that the reverse may not hold true, and a vertebral caries may run a quiet course with no symptoms but the advancing kyphos. The following case reported by Howard Marsh in the *London Lancet*, 1893, ii., 791, is a good example.

"A boy aged nine had a perfectly obvious and advancing angular curvature of the dorsal spine, for which complete rest and a plaster of Paris jacket were employed. When this treatment had been followed for six months the patient was taken to a bone-setter, who said that one of the buttons of the back was out. This he proceeded to put in by manipulation—although, as you may suppose, without producing any change in the curvature—and he then ordered the boy to go about as usual. He forthwith did so, and no further development of spinal symptoms has since occurred. * * * When angular curvature has once become marked, sound repair does not generally take place in so short a time as six months; but this form of plastic inflammation leading to rapid anchylosis may run its course well within this period."

Symptoms due to interference with a nerve at its exit from the spinal column.—This group is a large one and, as the pain and other symptoms are referred to the periphery of the nerve, the vertrebal disease is often masked and thus

overlooked. A cervical caries may closely simulate *cerebral disease* on account of the evident pain with rigid neck, retracted head and grunting respiration, and this is especially true when the disease is accompanied by a retro-pharyngeal abscess, which may produce the irregular breathing of a brain lesion. When the disease involves the first and second vertebrae and the transverse ligament of the second vertebrae is more or less destroyed, it will allow some displacement and consequent pressure on the cord, so that you really do get a secondary brain lesion. There is either sudden death or an effusion of fluid in the ventricles or base of the brain, or both, which is marked by headache, convulsions, stupor, dilated pupils, and other symptoms of effusion of fluid in the brain. *Pneumonia* and *bronchitis* may be simulated on account of the peculiar grunting respiration, the pain in the chest, the dyspnœa with cyanosis and the cough. Again, the pain at the periphery of the spinal nerve may be so severe and accompanied by such intense hyperæsthesia that, according to the location of the disease in the spine, the patient may be supposed to have *pleurisy*, *dyspepsia* or *gastritis*, especially when obstinate vomiting is present; *peritonitis; kidney disease* from the pain of inferior dorsal caries being in or near the kidney and accompanied by an alkaline or even albuminous urine; *cystitis* or *stone in the bladder*, *ovarian* or *uterine disease*, *rectal disease; neuralgia* involving almost any of the peripheral nerves; and finally *rheumatism*, not only from the pain but from the muscular stiffness.

This whole group can be easily excluded if we remember that all these symptoms may depend upon a vertebral caries and we therefore make a careful examination of the spine. Cerebral disease and rheumatism may be rather difficult to exclude, but in neither is there a genuine reflex spasm, and in cerebral disease the limitation to motion is not in every direction, and in rheumatism the muscular stiffness usually involves more than the spinal muscles, it is greatest in the morning after rest in bed and diminishes on exercise, and there is marked local tenderness.

Always examine carefully the spine of a child that complains of *persistent* pain in the chest, in the abdomen (bellyache), in the legs (growing pains) or in the occipital region. This pain is especially suggestive when increased by movement and relieved by rest or support of the spine.

R. H. Sayre reports some interesting cases in adults in which the reflex pains of uterine and ovarian origin closely simulated Pott's disease—a curvature due to weakness and which finally became rigid, a protected walk with pain on the slightest jar, but not relieved by rest in bed or support. The youngest case was a girl, aged sixteen years, pale, anæmic and pasty looking, with a cough and a husky voice. Menstruation had ceased for a number of months. She had a marked stoop in walking and a cautious tread, with pain in back which sometimes extended to the legs and the lower part of the abdomen. There was a sharp knuckle at the first and second lumbar vertebræ, but it disappeared entirely upon manipulation and all the symptoms disappeared as soon as the uterine trouble was cured.

Symptoms due to a spinal abscess.—This group includes suppurative processes in almost every location. There should be no difficulty in making a correct diagnosis, if the possibility of such an origin for these suppurative processes be considered. Edmund Owen says that fistula in ano is such a rare result of spinal caries that its origin is likely to be overlooked, and William Alexander reports a case of caries of the atlas and axis which had been treated as ozœna for several months on account of the foul nasal discharge until symptoms of pressure on the medulla showed its real character. It is not rare to see cervical caries mistaken for *cerebral disease* on account of the pain, rigidity of the neck and malposition; a retropharyngeal or lateral pharyngeal abscess of spinal origin for *croup* on account of the dysphagia and obstruction to respiration; and a psoas abscess extending along the inguinal canal and presenting below Poupart's ligament for a *hernia;* but a careful examination of the spine will

show the true origin of the trouble. The psoas abscess not only presents none of the characteristic signs of a hernia, but it lies outside the femoral vessels, as a rule, and it causes a well marked contraction of the psoas muscle with consequent limitation to extension of the thigh.

Curvature of the Spine.—It rarely gives any trouble to exclude vertebral caries from the *debility curves* resulting from rapid growth or convalescence from serious or protracted disease; the *occupation curves*, *round shoulders*, the stoop of *shortsightedness* produced by efforts to accommodate the figure to the imperfect vision; the characteristic stoop of *asthma*; the curvature from *paralysis* whether due to peripheral neuritis after diphtheria, etc., or due to central lesions; *scoliosis*, *congenital malformations* of the spine; curves from disease within the thorax, as *empyema;* the lordosis of *tumors* of *abdomen*, *pseudo-hypertrophic muscular paralysis*, *congenital or unreduced dislocation of the hip*, *spina bifida*, and *paralysis* of the abdominal or spinal muscles; and the curves of *cretinism*, *scurvy* and *rickets*. In all of these conditions :

1st. The deformity is rounded and not angular, and can usually be overcome without pain.

2d. The spine is flexible, usually in every direction, but always in one.

3d. Although in long continued cases there may be pain and some stiffness, the pain is local and only a late manifestation, and the stiffness and limitation to motion, when present, is a hard, unyielding rigidity and does not have the characteristics of a true reflex spasm.

4th. There is no evening rise of temperature, except occasionally in rickets and in scurvy.

William Wallis Ord reports an interesting case of sporadic cretinism in which the deformity of the back was supposed to be due to caries. The patient was a male child, aged nine and a half years, and the deformity was due to weakness of the spinal muscles. There was a very marked antero-posterior curve to the spine at the junction of the cervical and dorsal segments. The curve was

rounded and in no way angular. The vertebræ from the fourth cervical to the eighth dorsal were bowed backwards, and the lumbar spine was bowed forwards in a corresponding manner.

Paterson reports a similar case in a boy, aged nineteen months, and Bury says of the spine in cases of cretinism that it "is often curved; in the cases seen by the writer, the lower cervical and upper dorsal vertebræ formed a rounded prominence behind, while the lumbar region presented a deep concavity, as if dragged forward by the enlarged and protuberant abdomen."

In rickets we meet with several varieties of curvature—the usual general bowing of the whole spine backwards, an ordinary lateral deviation, and more rarely an increase of the lumbar curve forward, expressed by the people, according to Marsh, as "cutting his teeth in his loins." In certain cases, especially infants, a differential diagnosis may be difficult because these children are so often tender, and cry and hold themselves rigid on being handled. Much is added to this difficulty when the disease is accompanied by the so-called rachitic paralysis, which is due partly to weakness and partly to disinclination to walk on account of the general tenderness. Of course it has none of the characteristics of a Pott's paralysis—it is not localized, the tendon reflexes are not exaggerated and the electrical reactions are not changed.

In infants who are suffering from scurvy, a wrong diagnosis of caries may be very easily made on account of the fever, the curvature of the spine and the general tenderness. The diagnosis is especially obscure when you also get a kyphos of the spine with marked limitation to motion, as in the case of Dr. H. Ling Taylor.*

Again, in this group of cases, the reverse may be true and cases of vertebral caries may be mistaken for other diseases. William Alexander reports several cases of lumbar caries which were treated as abdominal tumors. There were no signs of spinal disease, and the lordosis was supposed to be due to the large abdominal tumor

* Archives of Pediatrics, 1894, xi., 648.

which in some cases filled the whole lumbar and iliac regions and pressed all the organs out of the way. The true character of these tumors was not suspected until aspiration revealed pus and pointed to the real cause.

Disease in the Neighborhood of the Spine.—In this group even the most careful and experienced surgeon will meet many difficulties in diagnosis. Theoretically the differential diagnosis should be very easy—none of these conditions having a true reflex spasm, angular deformity and limitation to motion in every direction—but practically the diagnosis may be very difficult and sometimes even impossible.

Myositis ossificans can be easily excluded from Pott's disease on account of the character of the "hump" which is chiefly in the muscles and is not confined to the spinal ones, and the absence of pain, suppuration, fever, reflex spasm and rigidity of the spine.

Whether inflamed lymphatic glands of the neck are secondary to a vertebral caries or not is often very difficult to determine, and before the stage of deformity it may be impossible. However, a digital examination of the pharynx may throw light on the origin of the trouble, and, if there is no spondylitis, the limitation to motion is only in such directions which cause the inflamed tissues to be put on the stretch, and rotation of the head is very much limited. In Pott's, if atlas and axis disease be excluded, rotation of the head is excellent, and there is limitation to motion of the neck in every direction.

Psoas contraction may be caused by many conditions besides caries of the spine, the most frequent being peri-typhlitis, peri-nephritis, uterine or other pelvic inflammations, disease of the ileum, the sacro-iliac and the hip-joint, cancer of the kidney and other abdominal tumors, burrowing of pus from a suppurative inflammation in distant parts as the spleen, the liver and the pleuræ, and from a primary inflammation in the ileo-psoas muscle. However psoas contraction is almost pathognomonic of a vertebral caries when the history of the case shows it to be a chronic process of insidious origin with acute ex-

acerbations followed by stages of quiet. It is the only cause of psoas contraction in which there is a kyphos of the spine and limitation to motion in every direction.

In perispondylitis, whether due to syphilis or one of the infectious diseases like typhoid fever, there should be no trouble in making a diagnosis on account of the intense local pain, not relieved by rest and support with a brace, and the pain and fever is greater than would be expected from a tuberculous ostitis. Intense local pain is not a prominent symptom of vertebral caries and its presence is more likely to suggest a neurosis—hysteria, spinal irritation, railway spine, many cases of so-called typhoid spine,—and more rarely a perispondylitis, rheumatism, an aneurism or a local injury like a strain. Dr. Shaffer reports a case of typhoid spine in which there was intense pain, not relieved by protection, and considerable and prolonged fever. The diagnosis of perispondylitis was confirmed at the autopsy. On the other hand the cases of typhoid spine reported by Gibney, Ryan and others seem to be rather typical cases of neurasthenic spines such as may come after any prolonged and exhausting disease. Ryan reports a case twelve years old, and Gibney's youngest case was fifteen years old. The latter was a boy and the symptoms appeared towards the end of convalescence from typhoid fever. There was severe pain in the back, chiefly in the lumbar region, which was relieved by a spinal support. The tenderness on pressure was only moderate, but any motion caused intense pain. There was no deformity, no psoas contraction, no fever, and no spinal pain at the distribution of the anterior crural or sciatic nerves. He was practically well in two or three weeks, although he wore the support for one year.

Torticollis may be congenital or due to some reflex irritation from the eyes or naso-pharynx, or to inflamed lymphatic glands or other phlegmon of the muscles of the neck. With the exception of the latter form, which has been discussed, Pott's disease can be excluded by the absence of pain; the contraction is usually of the sterno-mastoid and not of the posterior spinal muscles, as in

vertebral caries, and motion is limited only by contracted muscle and not in every direction by reflex spasm and pain; the deformity is not relieved by rest in bed, extension or instrumental support, and in true wry-neck even ether does not abolish the contraction; there is no fever, no kyphos, no suppuration and no genuine reflex spasm; in true wry-neck the head and face are distorted and the eyes are not on the same level; the head is rotated away from the contracted muscle, and in vertebral caries the reverse is true. However, when the deep muscles of the spine are involved it may be far from simple to make a diagnosis. If no deformity is found externally, a digital exploration of the pharynx may be of service.

The lateral curvature which comes in certain old and extensive cases of caries is accompanied by so many other signs of the original process that a mistake in diagnosis could hardly be made. True rotary lateral curvature can usually be distinguished from caries without difficulty by attention to the following points:

1. The curve is rounded, not angular.

2. The rotation is always on the side of the convexity of the curve; in caries it may be on either side.

3. The limitation to motion is only in the direction which tends to straighten the curve; in caries it is in every direction.

4. Pain is usually absent and, if present, local and not at the periphery of the spinal nerves.

5. The curve is not diminished by rest in bed or by anæsthesia, as it is in caries.

6. It is frequently associated with other evidences of some central lesion as atrophy of the mammary gland and non-deforming club-foot.

7. There is no psoas contraction, no fever, no suppuration and none of the other characteristic signs of spinal caries.

However, the diagnosis may be so obscure that only a careful observation of the case over a long period of time will make it clear, as is demonstrated by the following case, reported by Ridlon.

The patient was a girl, five years old, with a good family history. She was seen for the first time on April 8, 1889, three weeks after she began to walk, leaning somewhat to one side. She presented all the symptoms and objective signs of a true scoliosis—right shoulder higher than the left, right scapula tilted forward with its lower angle prominent and somewhat further from the spine than the left, a mid-dorsal curvature to the right with bulging of the ribs on the side of the convexity, a lumbar curvature to the left with prominence of the muscles on the side of the convexity of the curve, no pain, no tenderness, no antero-posterior curve, angle or kyphos, but there was slight rigidity to passive manipulation in the dorsal curve. Under daily exercises, the diagnosis of scoliosis being made, the deformity steadily increased and the dorsal curve became more rigid. At the end of seven weeks the exercises were discontinued, and at the end of three months the lateral curves had disappeared and there was a typical angular kyphos at the tenth dorsal vertebra.

In sacro-iliac disease, which is very rare, there is present as in spinal caries the weakness of the back, the pain on jarring and consequent effort to protect the spine and pelvis, and all the other signs common to a tuberculous ostitis. On the other hand the pain is confined to the bottom of the back, and not referred to the area of distribution of the spinal nerves, and if pain is referred to the leg from a branch of the obturator, it is not symmetrical. The spine is normal as regards motion and deformity. Again, puffiness over the sacro-iliac joint and pain on pressure over the neighborhood of the posterior iliac spine is suggestive.

Hip-disease may be confounded with vertebral caries, especially lower dorsal and lumbar, when accompanied by a psoas or sub-gluteal abscess.

The diagnostic points which help in excluding a coxo-femoral ostitis from vertebral caries are: 1. In hip-disease motion at the hip is restricted by reflex spasm in every direction; in vertebral disease rotation is never restricted, although there may be flexion of the thigh with abduction and even eversion due to a psoas abscess, and flexion with adduction due to a sub-gluteal abscess. If the peri-articular tissues are invaded from a psoas abscess it will

increase the difficulty of making a correct diagnosis. Again, in acute hip-disease, there may be some rigidity of the lumbar and lower dorsal spine, but this limitation to motion will not be in every direction. 2. In hip-disease, standing on the lame leg will increase the pain and spasm, while in vertebral caries there will be no change. 3. The history of *complete* remissions to the lameness is the rule in Pott's and the exception in hip-disease.

Various Diseases of the Spine.—In this group of cases it may be difficult or even impossible to make an early diagnosis.

Chronic articular rheumatism (spondylitis deformans) is an affection of adult life. Muscular rheumatism can usually be made out by the local tenderness, its shifting character, the usual involvment of more than the spinal muscles, and the effects of rest and exercise.

A fracture or dislocation can be recognized by the history of injury and sudden deformity with the usual signs of such injuries, and the absence of all the characteristic signs of vertebral caries except the deformity.

An aneurism is usually made out long before it involves the spine. When the spine is involved, it gives all the symptoms of caries except the temperature, and the diagnosis must be based upon auscultation and the intense local pain, which rest and support does not relieve.

Strains of the vertebral column are rare in children and can be recognized only by the history of injury, which is usually obscure, their rapid recovery, and the absence of fever. At the onset, a sprain will give the characteristic walk and attitude of protecting the spine, the reflex spasm with restricted motion and both local and reflected pain.

Meningeal tumors inside the spinal canal can be easily excluded; but tumors of the vertebræ, especially malignant ones, present many difficulties. Dr. Judson reported the following case before the Am. Orthop. Assoc. in 1891.

When first seen the patient, a boy aged four years and eight months, walked with a stiff gait and stooped carefully. Pain in the back and abdomen, the chief symptoms,

had been present two months or more. There was very slight, if any, projection, but I made a diagnosis of incipient Pott's disease at the first or second lumbar vertebra. When I saw him again, twelve days later, he had been in bed for six days without motion or sensation of the lower extremities. He still complained of pain in the back. Pulmonary and urinary troubles intervened and death occured ten days later. At the autopsy no caries was found. There were numberless sarcomatous growths springing from the dorsal vertebræ and some of the ribs. They varied in size, the largest having a diameter of two and a half inches. This growth had also invaded the vertebral foramina." At the same meeting Howard Marsh, of London, reported the following case:

Mary T., aged seven years, was admitted into the hospital in 1885. For several weeks her mother had noticed that her neck was stiff and painful, so that she was unable to turn her head or to raise herself from the horizontal position without difficulty. Pain extended over the occipital region. On examination the case appeared to present the usual symptoms of caries of the upper cervical vertebræ. The spine was fixed, movement gave pain, and the child was unable to raise her head without using the hands for support, and unable to turn in bed. There was marked thickening posteriorly over the spinous process of the second and third vertebræ. The opinion formed was that the case was one of acute tubercular caries. The symptoms had existed about six weeks. The usual treatment by rest was adopted. Ten days later a swelling formed on the right side of the spinous processes, which being deep seated and highly elastic, was thought to be an abscess. A week later the swelling had much increased, and the elasticity was very distinct. An incision was made to evacuate the pus believed to be present, but nothing escaped but blood. The incision was extended to the depth of about two inches and the director came in contact with bare bone. Still no pus was reached. It was now evident that the disease must be a new growth. The swelling rapidly increased and the child died within a month. On post-mortem examination, a large sarcomatous tumor was found connected with the second and third vertebræ. The laminæ of each were in great measure destroyed. The growth was evidently primary and in its structure consisted of round-celled sarcoma. In the *London Lancet*, 1893, p. 791. Mr. Marsh adds to this case the history of another in a girl twenty-two years old.

It involved the lower part of the lumbar spine and presented in the left iliac fossa as a large, highly elastic, tense swelling which occupied the position of and presented a perfect resemblance to an iliac abscess depending upon Pott's disease.

The differential points are:

1. The pain, general disability and sickness are out of proportion to the apparent amount of spinal disease.

2. The onset is alarming and the progress of the disease is more rapid than in tubercular caries—the paralysis being an early symptom and the deformity appearing even in a few weeks after the beginning of the symptoms.

3. The local pain is intense; and the peripheral pains, the deformity, the extreme spinal disability and the paralysis, including incontinence of urine and fæces, rapidly grow worse in spite of rest in bed and instrumental support.

4. Secondary disease soon appears, rapid emaciation and marked cachexia are seen, and the patient does not live more than six to eight months.

Whether a vertebral caries is due to syphilis or to tuberculosis is of immense importance as regards prognosis and treatment. In both diseases the symptoms are almost identical, and the diagnosis must be based upon the history, the presence or absence of other evidences of syphilis, and the result of treatment. In tuberculosis there is more likely to be an evening rise of temperature, and the pus and debris may contain tubercle bacilli. Syphilis is suggested by nocturnal pains, and the involvement with chronic disease of some other joint or joints or some other part of the spine.

DISCUSSION.

Dr. Rotch said that this was an exceedingly valuable paper. There were two sides to the question; there were the surgical cases mistaken by medical men, and the medical cases mistaken by surgical men. He cited the case of a boy, four years of age, who had been treated for indigestion by two physicians whose diagnoses were or-

dinarily correct. The case, however, was from the beginning one of psoas abscess.

This case showed the importance of referring special cases to special practitioners. He had on the other hand seen patients treated by good surgeons for Pott's disease who had had absolutely nothing but scorbutus. The moral was that we should all work together, and not think that we all knew everything. Let the men specially trained in certain branches see the cases, and let us consult freely with one another.

Dr. Holt also cited an example of the same kind—a child with all the symptoms of cervical Pott's disease, and with compression myelitis. The symptoms began with stiffness of the neck; then a paralysis of the upper extremities was added, which became almost complete. The lower extremities were involved to a slight degree, and there was an exaggerated patellar reflex and ankle clonus on the right side. There was also a little fever. The autopsy showed the spine entirely normal, but there was a glioma of the spinal cord, which began at the medulla and extended down to the cervical enlargement of the cord, at which point it was fully four times its normal size and thickness. It was difficult to understand how the lower extremities escaped complete paralysis. This child had had no vaso-motor symptoms, as might have been expected with such an extensive involvement of the cord.

A CASE OF CONGENITAL RACHITIS.

BY CHARLES W. TOWNSEND, M.D.,

Boston.

A child with marked rachitis was born March 20, 1894, in the out-patient department of the Boston Lying-in Hospital. The parents were both young, healthy and well-formed, and there was no syphilitic or rachitic history. The father was born in Rhode Island, the mother in Scotland. Their first child was three years old, well and strong, showing no signs of rachitis. During the time that the mother was pregnant with the child I am about to describe, the family were wretchedly poor, the father being out of work. The mother admits that she has worried a great deal, and has probably suffered from insufficient nourishment.

The child, a male, was about a month premature. The labor was easy, requiring no interference. The child weighed seven pounds and was seventeen inches in length. The head was 13¼ inches in circumference, square in front, much flattened behind. The sutures were all widely open. The ossified portions of all the bones of the skull were small, particularly of the occipital, which presented a large area of craniotabes and of membrane with deficient ossification between it and the parietal bones. In the widely open sagittal suture, just back of the anterior fontanelle, was a large Wormian bone an inch long. In the squamous and coronal sutures on the right side, at least eight small Wormian bones could easily be felt, and on the left side eleven were counted.

The chest was small, 11⅜ inches in circumference, depressed laterally, the depression increasing with each inspiration owing to the atelectasis in the lower portions of the lungs. On this account there was considerable cyan-

osis, although some of this may perhaps have been due to an open ductus arteriosus. No murmur could be heard over the heart.

There was marked enlargement of the epiphyses of the ribs forming the characteristic rachitic rosary. The abdomen was large. It measured 11½ inches at the level of the umbilicus. This measurement would have been greater were it not for a large double inguinal hernia, through which some of the intestines escaped. The spleen could not be detected by examination. The liver was felt below the edge of the ribs, but was apparently not enlarged.

The extremities showed marked evidences of rickets by (1) enlargement of the epiphyses; (2) curvature of all the long bones; (3) numerous fractures. The enlargement of the epiphyses was easily noticeable, especially at the distal extremities of the radii and humeri and both ends of the tibiæ.

The curvatures were particularly interesting. Both humeri showed a slight anterior curvature. The bones of each forearm were also bent anteriorly, a curvature in older children thought to be due to the weight of the body pressing forward in a sitting posture on the supporting arms. The femora were curved outwards and forwards. The lower legs showed marked angular curvatures forwards at the junction of the middle and lower thirds, so typical in extreme rachitis of infants. These curvatures must all be explained by the action of the muscles on the soft rachitic bones while the fœtus lay curled up in the uterus.

Complete fractures existed at birth of both tibiæ, of the left humerus, and of both bones of the forearm on the right side. The fractures were situated in the middle or lower third of the shaft, were complete and were easily recognized both by the mobility and by the very marked crepitus. In the lower leg the fractures were at the point of greatest antero-posterior curvature.

These fractures, which have been observed in other cases of intra-uterine and congenital rickets, are due to

the extreme brittleness of the bones—a late phase in the rachitic process—from defective calcification, large medullary spaces and narrowed septa. The fractures may have been produced by muscular action of the fœtus or by the slight strain put upon them at birth, which, as I have noted, was particularly easy. That they were of as recent origin as the birth seems probable from the fact that some of the fractures proceeded to unite very quickly. On the eighth day the right tibia was quite firmly united; the left would allow hardly any movement, but a slight crepitus was still to be felt. The left humerus was firmly united with a ring of callus. The right forearm showed at this time no signs of uniting. The right humerus showed at birth a callus about the middle of the shaft which points to repair of an intra-uterine fracture.

The child was artificially fed and died on the ninth day, having been always cyanotic. It is to be regretted that the body could not be obtained, or even an autopsy made, but the accompanying photograph taken on the fourth day gives some idea of the case.

I have been able to find but three cases* of congenital rachitis reported from this country, hence it seems of importance to put this case on record.

In Europe, particularly in Germany, a number of cases of congenital rickets have been reported, resembling very closely the case I have related. Schwartz, of Vienna, and Lauro, of Naples, have shown the not infrequent occurrence of rachitic lesions of a mild grade in the newborn.

Schwartz goes so far as to say that among 500 newborn infants in the second Vienna Obstetric Clinic, only 19.4 per cent. were free from some evidence of rachitis.

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* These cases are one by Dr. A. Jacobi, reported in the *New York Journal of Obstetrics*, for 1870. Dr. J. L. Smith reported a second case in his work on the "Diseases of Children," giving a wood-cut of the skeleton. A third case is reported in the same work by Dr. Smith of a case of Dr. Heitzman.

INFANTILE MYXŒDEMA.

(TWO CASES.)

BY WM. P. NORTHRUP, M.D.,

Adjunct Professor of Diseases of Children, Bellevue Hospital Medical College; Visiting Physician to N. Y. Foundling, Presbyterian and Willard Parker Hospitals, Consulting Physician to N. Y. Infant Asylum.

The purpose of this paper is to discuss myxœdema only as illustrated by two cases systematically observed and treated in hospital (Presbyterian, N. Y.). The general subject is fully discussed in current literature.

In the short days of mid-winter I was called by total strangers to see a man eighty-two years old. He was not very sick, but being an old person, the friends were of opinion that he might die, and it was but humane to have a doctor. While conferring with the old man I heard, in an inner sleeping room, a grunting sound, and on inquiry was told it was from the baby. As a matter of general interest I started to find the baby, going into the rear room. No baby was there. Usually mothers are proud and happy to exhibit a baby, but for some reason, though the mother spoke in tenderest tones of her offspring, I could not see that she was getting ready to show it. She was soon convinced that my exploration would bring me to the source of the grunting and pointed to a crib at the foot of the bed in the inner room. I had passed it twice in the obscure corner without suspecting its presence. After bending over the foot of the crib and peering into the dark for a moment or two, I saw the sluggish rolling movement of head upon the pillow, but to my view it was not altogether clear what manner of being was there. The more I peered the more I was perplexed. At this point the rather embarrassed mother came forward and took out of the dark corner the object shown in the photographs herewith.

One may readily imagine the sensations that an observer might experience when this naturally rather

refined mother took to her arms this little creature and lavished upon it all the endearing epithets that a human heart could pour out upon its young.

It was in truth a pale, frowsy, stumpy idiot.

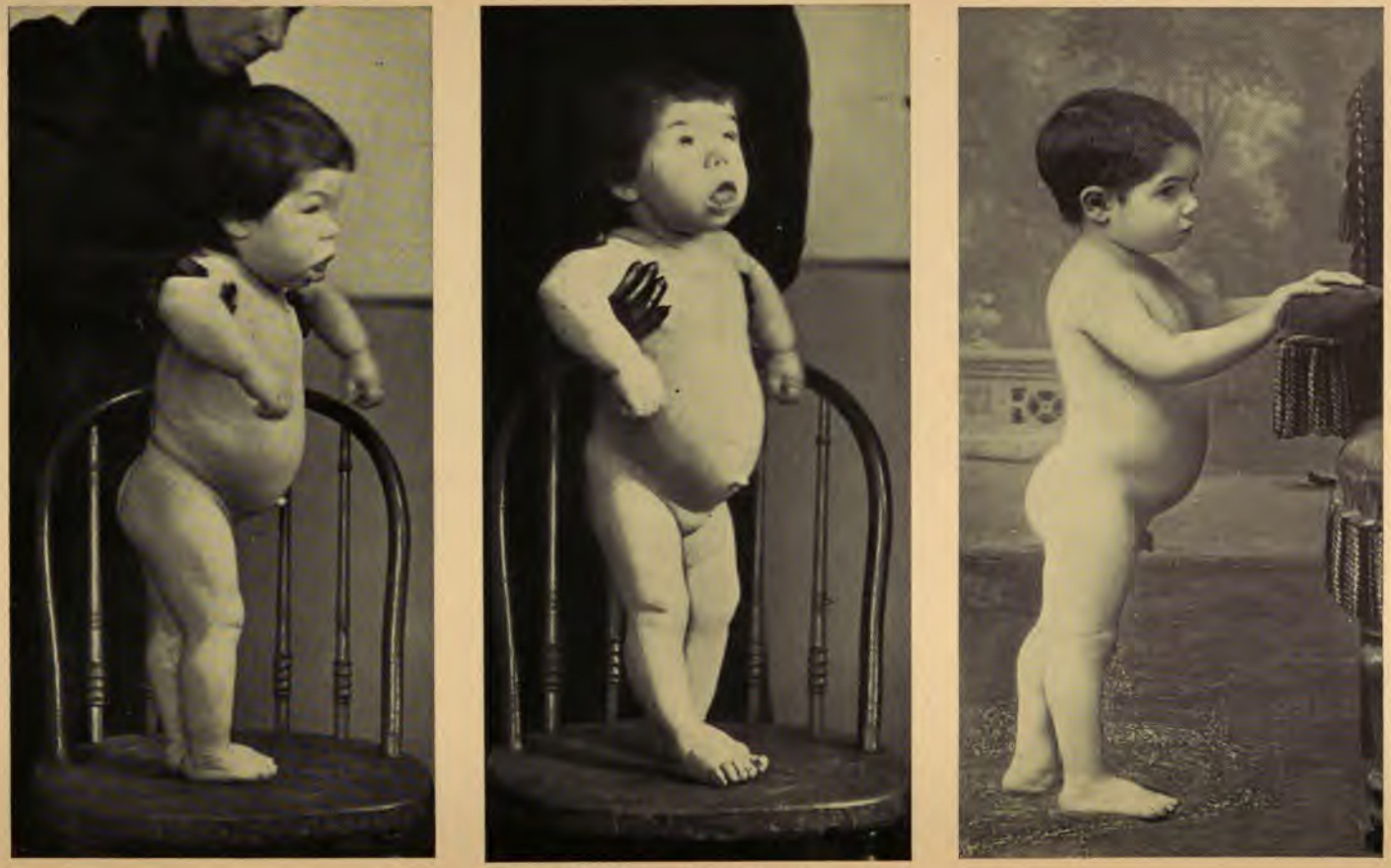
The following is its history:

CASE I.—*Infantile (or Congenital) Myxœdema—Under Thyroid Treatment Eighty Days—Little Improvement.*

Female; nine years old; parents not consanguineous; labor normal, not tedious, no instruments; up to nine months of life considered a perfect child.

Of the parents it may be said the father is a large, florid, powerful man, American by birth, now forty-five years old. The mother is now thirty-nine years old, is strong and healthy, has borne five children and had several miscarriages. The patient is the fifth child. Two are living and healthy, the oldest two are dead, one by accident, the other by an acute infectious disease. Their home was in Ohio and Western Pensylvania. The mother has no favorite theory to account for this child's unusual development. Cannot even remember that she was seriously frightened or chased, or that she reached up or stepped down. When about nine months old, she thought the child did not sit up as her others had done, and gradually she sought advice for the supposed weakness of the spine. Practically this child ceased its normal development at nine months and at nine years was mentally no older, while physically it merely thickened. Between nine months and nine years naturally the parents sought much medical advice, first from the learned of our profession, then from the boasting pretender, and sought the cell of the hermit in a mountain resort near her home, and at last the mother hid her little unfortunate from the gaze of the world and said prayers over it. At this moment the child is more to her than any other of the family. It broke her heart to leave it in a hospital crib, she visited it every day and at last insisted she must have it with her at home at any risk. To the mother, strange to say, the child was not so very dull. It knew her certainly and smiled. It fumbled with its shoes and stockings, at last pulled them off—but this was a nine-year-old child, not nine months.

Present condition.—The first impression one gets on looking at this cretin is that it is an idiot, that its head is large, and its color is peculiarly tallow-like, not yellowish as many describe it, and scarcely waxy



CASES OF MYXŒDEMA.

but tallowy. The hair is thin, though at first it seems abundant; this is because it is long, dry and spreading. It looks like a brown hair that has been washed and dried; it is poorly nourished, has no lustre. Eyebrows are present as seen in photographs, of fair growth and not remarkable.

This cretin has the characteristic flattening of the bridge of the nose, a tilting back, the nostrils facing forward, *retrousse*, as some one describes it; diffuse swelling of the under lids, puffiness of upper, pendulous cheeks, thick anæmic lips with protuding swollen, pale tongue, the lips and tongue tending to dry. Has fourteen first teeth, those on the upper row eroded, appearing only at the bottoms of a series of ulcers in the upper gums. Lower teeth nearly the same and the gums in a filthy, suppurating condition. A heavy sweetish, characteristically offensive odor about the mouth is always present. Indeed this was the one thing which made the patient a little unwelcome in the ward. The general figure as shown in photographs is very similar to that of Bromwell's case. The arms and legs are thick, the feet and hands stumpy, the belly prominent and embossed with the usual umbilical hernia. The skin is pale and peculiarly mottled purplish, as seen in profile upright figure. The eyes are dark blue or gray. The usual dorso-lumbar posterior spinal curve, so often observed, was present in this case. The skin, though never sweating, was soft and not abnormal, except upon the hands and feet. The hand which rests upon the mother's glove in the sitting photograph shows the parchment-like wrinkling very similar to the glove wrinkling by its side. Palms and soles are dry and parchment-like. As to œdema—this case never suggests the idea of hard œdema or firm œdema. The feel is best described as puffiness or flabbiness. If one grasps the arms to lift the child, as ordinarily, one is surprised at the sensation—the grasp seems to sink down upon the bone-shaft, the flesh seeming to contain nothing but a jelly-like flabby fat which squeezes out between the fingers. The legs are the same. Again the absence or weakness of muscle is suggested by the flopping about of the head, as the child is lifted. The child cannot sit up, can just balance its head when the trunk is supported upright. It can stand when once balanced and allowed to grasp some fixed object.

The supra-clavicular pad mentioned by most writers is present, is soft and flabby. The thyroid gland seems to be present and possibly a little enlarged. The sterno-

cleido-mastoid muscle feels like a tape in the flabby neck and beneath it can be rolled about the lobe of the thyroid.

Disposition.—When asked about this the fond mother, in melting tones and emphasis replied, "lovely." This, allowing for the point of view may, perhaps fittingly describe it. At least its action, never showed that it missed its mother. The entire novelty of a child's ward in hospital may have entertained it enough to render it unusually quiet, certainly it never raised its voice, was absolutely passive, would sit for any time tied into a small chair, its eyes wandering slowly about the ward, wrinkling its forehead — doing everything slowly. Deliberation or mental sluggishness was a feature, though since it never spoke the delayed cerebration was less conspicuous. It had said *da-da*, and could be persuaded to say it at times again, but never another word. As to all its physical needs it, of course, required looking after as much as its physical age indicated, namely, a child of nine months.

Some evidences of rickets—small costal heads, open anterior fontanelle. Spleen not felt.

Has always been constipated, flatulent. Has been no better Winters than Summers.

Under Treatment.—A few days were allowed to ascertain the natural course of the temperature. First temperature on arriving at hospital was by rectum 97½° F. In afternoon of same day it rose to 99½° F.; the second day it was 98½ and 99°, the third day 98½ and 99½°. Bowels were at first very constipated; relieved by laxatives. On the fourth day it was thought the patient was well enough known to warrant a beginning of its specific treatment with thyroid gland extract. She was believed to belong to the class of sporadic cretins, or infantile myxœdema, congenital myxœdema, as variously called, and to be a fair subject for testing the efficiency of the treatment. Dr. M. A. Starr, consulting physician to the hospital, and Dr. George Crary had concurred in all our plans. Her temperature was found not to be subnormal, but to range 98½ to 99 or 100° F. daily; her respiration 16 to 20; pulse 80 to 88. She was obstinately constipated; her gums habitually ulcerated and foul, breath consequently bad.

Plan of treatment was to administer a reliable form of sheep's thyroid gland, regulating the amount by the range of the temperature. Temperature measurements were made every two hours, thermometer in rectum. Crary's formula of glycerine extract of sheep's thyroid gland, each drachm representing a gland of a yearling, was secured. The directions were to begin with one minim three times a day, increasing the dose one minim every second day, until the temperature rose, and try and keep the temperature at a point just below 100° F. On the fourth day the temperature overstepped the limit, and the thyroid was stopped for a while.

Two days later her appetite was improved, breath not offensive; taking milk and solid food very well. Up to her arrival at hospital she had taken only milk and potato.

Of course correction of constipation and cleansing of ulcerated gums would account for some improvement. Eight days after the beginning of specific treatment for her myxœdema the first note appeared which could show anything surely related to treatment. It was this: *Tongue is much smaller.* It was unmistakable; the mother corroborated this point, and upon this she became first reconciled to leaving the baby with us. Measurements were taken—no change. Weight 22 25 lbs. For another week the temperature line upon the chart kept within limits. Then it went too high, and treatment was suspended.

On this day a momentous thing occurred: The nine-year old infant cut its first canine tooth. Thus far four minims of the extract has been the highest daily dosing. The first day the temperature showed a tendency to decline the thyroid was again begun.

The pathologist's report on the blood of Case I. is as follows:

Hæmoglobin, 45%.

Red cells normal.

White to red as 1 : 230, that is somewhat increased. The urine could never be obtained, so we have no examination of it.

On the 28th day in hospital the cretin developed pneumonia which ran its entire course in 14 days; temperature of first three days 100½°—101½°—103° F.; physical signs dulness, bronchial voice and breathing, posterior, upper, one. Thyroid suspended for a few days and begun again. During this temporary suspension of the specific treatment the tongue swelled, diminishing again after treatment was resumed.

Photographs were not taken of the child at last, for there was little change that would be thus shown.

I have visited the child at its home after three weeks, and find that the improvements noted in the hospital have continued, viz.: diminution in the size of the tongue, somewhat brighter expression of countenance and ability to take varied food, acquisition of two teeth. All these points the mother and friends are convinced are real features, and are inclined to think they made a mistake in removing her from treatment.

We design to let her rest a little, still under observation, and then begin treatment, if possible, at her home.

In conclusion: After eighty days of treatment in hospital—child was improved in these respects, viz.: tongue smaller markedly, countenance brighter, taking more food and greater variety, any soft food, tomato, gravy, rice and oats; eats heartily, most too much. Under treatment lost weight at first, remained stationary later. It was thought she acquired her ability to stand by a fixed object while in hospital, but the mother insists she could do as much before. Cut two teeth (canines). Does not say more than da-da, which was her accomplishment before. Good-natured and much brighter the mother thinks. No perspiration. Perspired a little in hospital, it was thought. Feet not puffy. Bowels regular at present and eats a variety of food. Snoring or "purring" no longer present; blood and urine examinations always have been negative in result.

CASE II.—Harry N. (patient of Dr. B. Sachs). German descent, male, twelve years old. In hospital 76 days, improved; family history not known.

In general appearance (as shown in the photograph) he is short and stumpy, head large, long antero-posteriorly, broad across the eyes, flattened at bridge of nose, nasal openings pointed forward, limbs thick, stubby, abdomen prominent. Looks fairly intelligent, eyes bright. On first sight of him one would not be sure he could be classed among cretins.

On asking his name, age etc. his peculiarities were marked. If for the hundredth time one were to ask him sharply for his name, he would look straight into the eye of his questioner, and seem to be mentally rummaging to find it, then his lips would begin to shape themselves, he would take a long breath, open his mouth, and yet the answer would not come. It was as though the answer had to travel the length of the ward or had to find its way along tortuous paths, until at last it reached his lips, and he uttered in a thick, half nasal mumble, Hangree Nee-d-m-nn (Henry Needlemann). Then ask his age and he had regularly to take even a longer time. One seemed to see from the light in his eye that he was confident he would announce his age, but the central windings seemed always to be longer than on his name. Even if one regularly, over and over, alternated the questions, his delays were equally prolonged, and "twulf Nyearns" (twelve years) seemed to delay his cerebrations more than "Hangree Nee-d-m-nn."

Beyond answering the above questions I seldom heard him speak. He moved about the ward with a stiff, straight-backed, rocking gait, somewhat awkwardly. It was said he could run, but I never saw him. He always followed about with the doctors, visiting every bed, seemed to be very happy and fond of company, but seldom spoke. From his eyes one would think him intelligent, happy, with a rather bright appreciation of humor. He certainly had the characteristic good nature of all cretins.

Treatment.—For a week the boy was kept under observation to ascertain his natural range of temperature. It proved to be 98½ to 99° per rectum; pulse 80, 90 and 100, Resp. 20-24.

He was then given thyroid extract (Crary's), one minim three times a day. Temperature began to swing from 98 to 99½. In the third week of treatment it touched once a day 100, 100½°, and dipped twice to 97°, subsiding at night to normal. Thyroid extract was never given

above five minims a day, and stopped temporarily whenever the temperature went above 100°.

In the fourth week the temperature reached 103$^{6}/_{10}$° and after thyroid extract had been stopped two days, then gradually subsided and began sharp excursions in the other direction to 98½°, mounting to 100° on the same day.

Temperature with a certain amount of regularity was down all night and high several hours during the day.

The progress of the boy was favorable in these respects: the boy seemed mentally brighter, was a little more active and grew in height 1½ cm. His mental cerebrations were facilitated so far as we could judge after making allowances for a little shyness at the earliest part of his sojourn.

In conclusion: the judgment of those concerned was that for six weeks our two cases seemed to improve. Countenances were brighter, mental activities a little quicker, digestion and appetite little better. In one (the nine year old, female) the swollen tongue, which at first was very prominent, protruded; later became smaller, moist and could be taken in when she swallowed. She no longer drooled or "purred" when awake. Took a greater variety of food. She smiled, seemed more comfortable and in better health. The boy, twelve years old, went about everywhere, affording much amusement, his straight-backed, rocking gait and amiable face attracting attention. He seldom spoke; he seemed to be conscious that he was overslow about it. The day of "Hangree's" first pants and the tin watch will long be remembered.

The treatment will be continued, in the first case, to a year or more. We cannot be counted among the enthusiasts in cretin treatment, but, if we can let a little light into these brains, and get them even two or three years old, they may become of a certain amount of comfort to their parents, and certainly be less helpless.

THREE CASES OF ACUTE PYELITIS IN INFANCY.

BY L. EMMETT HOLT, M. D.,

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Acute pyelitis has been given but small space in pediatric literature. Cases depending upon calculi and congenital malformations are pretty well understood. It is also known that acute pyelitis occasionally occurs as a secondary affection of perinephritis. Most writers upon pediatrics and general medicine make the statement in a general way that acute pyelitis may accompany any of the infectious diseases, the eruptive fevers, diphtheria and malaria. Very few clinical observations have, however, been recorded. I have not been able to find in medical literature anything comparable to the second and third cases whose histories are given in this report. They are of such interest that I shall give them somewhat in detail, and with the histories shall present the full temperature charts.

CASE I.—A male infant fourteen months old, an inmate of the New York Infant Asylum. The child had been nursed by the mother, and with the exception of a mild attack of diarrhœa, had never been sick. On September 15, 1892, he was taken suddenly ill with a temperature of 103.5°. There were no local symptoms of disease excepting a slight stomatitis. On the second day the temperature ranged between 101 and 103.5°. A few rales in the chest were found, and pneumonia was suspected. On the third day the temperature was between 100.2 and 101.8°. Quinine was now ordered by the house physician, ten grains daily, the physical examination being practically negative, the signs in the chest not having developed further.

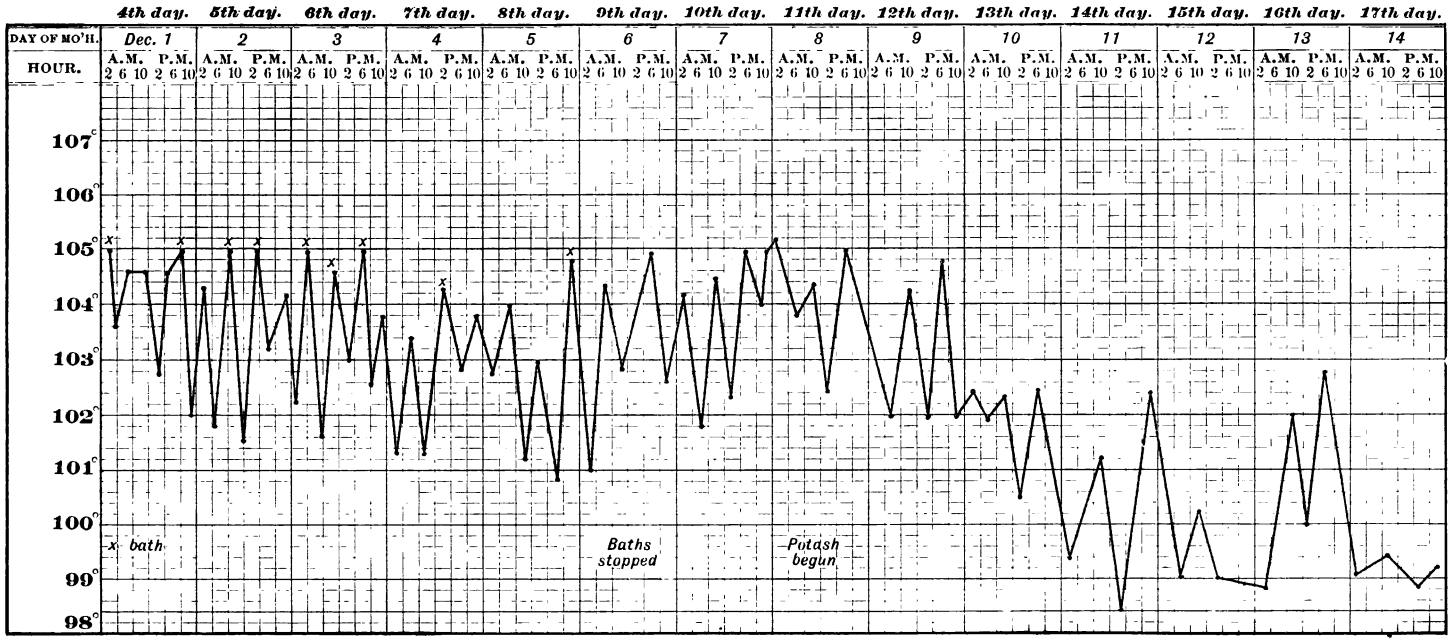
For the next four days a slight febrile movement continued, the temperature not rising above 101°. There

was now marked restlessness, pallor, the urine was noticed to be rather scanty and high colored. A specimen was secured for examination which after standing showed a deposit of pus nearly one inch deep, in a conical glass containing less than two ounces. There was a small amount of albumen present, and the microscope showed pus cells and epithelial cells, but no casts. The patient at this time was considerably prostrated, although he did not give the impression of being dangerously ill.

There was no subsequent rise in temperature. The pus continued to diminish gradually, although it was passed in small amount for three weeks. The examination of the urine two months later showed no trace of pus. At no time in this case were any casts found. Not enough urine could be collected to obtain the specific gravity. The child remained in the institution, and twenty months later Dr. Bremner, the resident physician, in response to an inquiry stated that the child had never had any subsequent urinary symptoms and had continued to the present time in all respects well. This case ran its course practically without treatment.

CASE II.—On December 6, 1892, I saw with Drs. Martin and Carman, of Harlem, a female infant eight months old who was reported to have been ill for nine days. The history given was as follows:

The child had been artificially fed from birth, but had never been previously ill. While apparently in perfect health, it was taken suddenly with a chill, followed by a very high temperature, which had continued up to the time of my visit. For the first three days the temperature record had not been preserved, but it had fluctuated between 103 and 106°. From the fourth to the eighth day it ranged between 102 and 105°, touching the latter point every day but one. The symptoms in other respects were almost negative. The prostration had not been great. There had been a very slight amount of indigestion as shown by an occasional green stool and a slight, inconstant cough. No evidence of local pain, no cerebral symptoms, no vomiting. Pneumonia had been sus-



ACUTE PYELITIS CASE II. INFANT 8 MONTHS.

pected, but up to this time no signs had been found in the chest. The case had been closely watched from the outset, but no diagnosis made. Quinine had been given in moderately large doses, without any effect. Baths had reduced the temperature only temporarily.

On examination I found a pale but fairly nourished infant, temperature 105°, pulse about 180°, respiration 76°, the child being at this time rather excited. There were six teeth, the gums were normal. The result of the physical examination was absolutely negative, there being no evidence whatever of any disease in the ears, throat, lungs, spleen, or anywhere else in the abdomen. The child did not seem to be very ill, and excepting when the temperature was high, was usually quite bright, playful, had a fair appetite, and was taking about twenty ounces of food a day. The continued high temperature and accelerated breathing led me to suspect pneumonia, notwithstanding the absence of all physical signs.

On a second examination, on the following day, the temperature was found but a little lower, and the respiration 40. A very satisfactory examination of the lungs revealed absolutely no signs of disease, and excepting for the temperature the child did not seem seriously ill. Pneumonia was positively excluded. The diagnosis was still obscure. I directed that an effort be made to secure a specimen of the urine.

At my third visit, on December 8th, on the eleventh day of the illness, sufficient urine was collected for the first time for examination. Only three or four drachms were obtained, but this showed a very heavy deposit of pus in the test tube and a trace of albumen. The reaction of the urine was strongly acid. Under the microscope in addition to pus there was found bladder epithelium, but no casts. There had been no trace of œdema, up to this time the urine had been abundant, and there had been no deposit upon the napkins. There was no tenderness over the kidneys, no evidence of a tumor, and no signs of cystitis and vaginitis. Micturition was not abnormal either in frequency or in the amount passed.

Citrate of potash was now begun in doses of gr. ii. every two hours.

On December 10th, two days later, the first natural fall in the temperature was seen since the beginning of the illness. The child was now taking gr. xxiv. of the citrate of potash daily, which had very much increased the quantity of urine and had neutralized the acidity. It was difficult to estimate the amount passed, but in twenty-four hours twenty-eight napkins were wet. About six drachms of urine were collected for examination. This, after standing in a conical glass, showed a deposit of pus ½ inch deep, or about 8 per cent. of the volume of the urine.

On December 12th, the temperature touched normal for the first time, it having been below 102.5° for the last three days, falling gradually. The amount of pus discharged was still large, although diminishing. Daily microscopical examinations of the urine were made, showing pus, a few bladder epithelial cells, and a small number of renal epithelial cells, but only a few hyaline casts. The quantity still continued very abundant, the reaction very alkaline under the influence of gr. xx. of the potash daily.

From this time the child improved rapidly. Recovery was interrupted on the sixteenth day by a temporary rise of temperature, apparently from constipation. The amount of pus gradually diminished, and at the end of three weeks it had practically disappeared from the urine.

Sixteen months later, in April, 1894, Dr. Martin wrote that the child has been entirely free from urinary symptoms since the last note, and its general condition had been good.

CASE III.—A female child, nine months old, under my personal observation since birth. Until ten days before the present illness, when it had what was regarded as a mild attack of influenza, the child had never been ill. Its nutrition had been excellent, leaving, in fact, nothing to be desired.

On February 8, 1894, the child was taken suddenly, about noon, with a distinct chill. I saw the case a few moments later, before the chill was over. The lips and fingernails were blue, and there was a distinct chatter to the teeth, with shivering of the entire body. It was as typical a chill as one ever sees in an adult. There was considerable prostration, and the rectal temperature was 103°. Under the use of a hot bath and stimulants reaction was established in a few minutes, but an hour later the temperature was 104°. At 5 P. M. the same day the temperature had fallen to 99.5° (rectal), and all symptoms had disappeared. At 7 P. M. the temperature was normal, the child sleeping quietly, and was apparently well.

A little after midnight a second chill occurred, in all respects similar to the one at noon, excepting that it was not quite so severe. Temperature 103.4°. Hot baths and stimulants were repeated. At 7. A. M. on the following morning the temperature was 99.4° and the child was submitted to a second thorough examination, with absolutely negative results. Quinine was now ordered, two grains of the bi-sulphate being given every three hours per rectum. By 1 P. M. the temperature had risen to 103.4° without any chill. It fluctuated during the evening, and at 10 P. M. had again risen to 105°. Up to this time, especially when temperature was high, there had been some prostration, the child was indifferent to surroundings and rather fretful, and had but little appetite. As soon as the temperature fell the child would laugh and play as usual, took its food well and, apparently, seemed quite normal in every respect. The movements continued good, and nearly the usual amount of food was taken.

On the third day two severe chills occurred, the temperature rising immediately after, in one case to 105° and in the other to 104.5°. A fall occurred in the course of three or four hours with quite a profuse perspiration. The quinine by rectum was not retained, and during the day twelve grains were given by the mouth and retained.

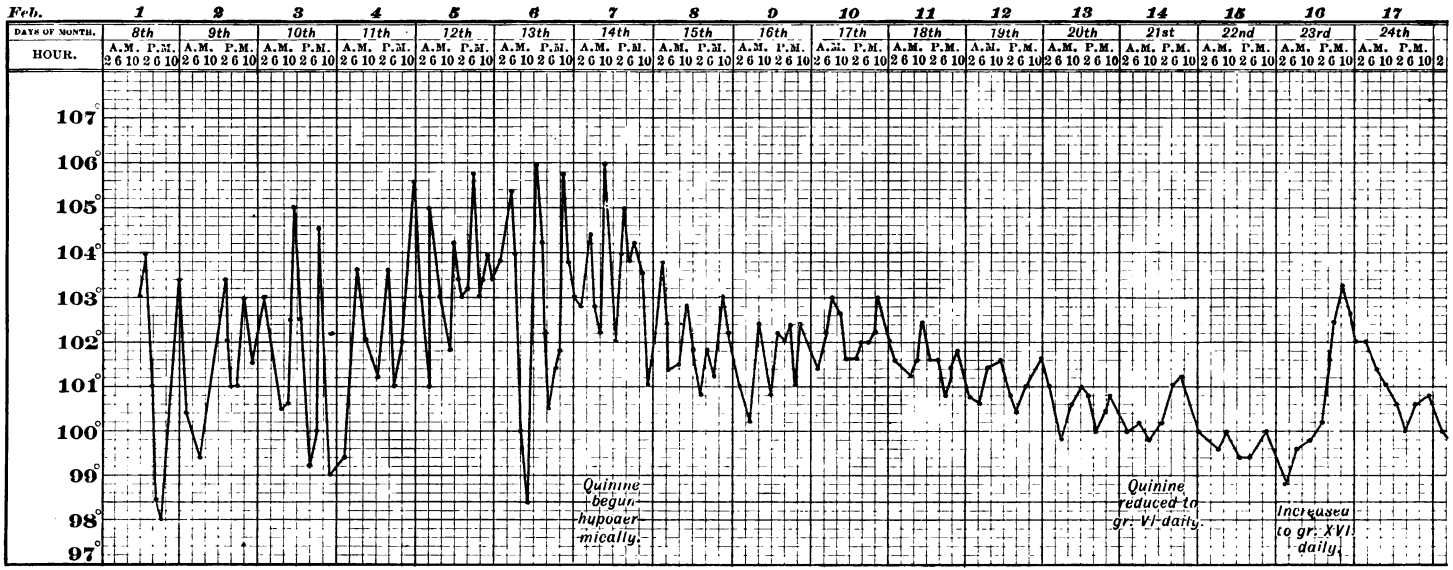
On the fourth day gr. xivss. of quinine were given by the mouth and retained; the temperature still fluctuating widely, but no distinct chill. During the day it was noticed that there was some straining and pain on micturition, and that the urine was passed only in small quantities. This evening for the first time a specimen was obtained for examination. The reaction was very strongly acid, and after standing there was a deposit of pus equal to about one-fifth of the entire volume of the urine; sp. gr. 1012, and a trace of albumen.

Quinine was now discontinued and citrate of potash gr. ii. every two hours given and hot fomentations used over the kidneys.

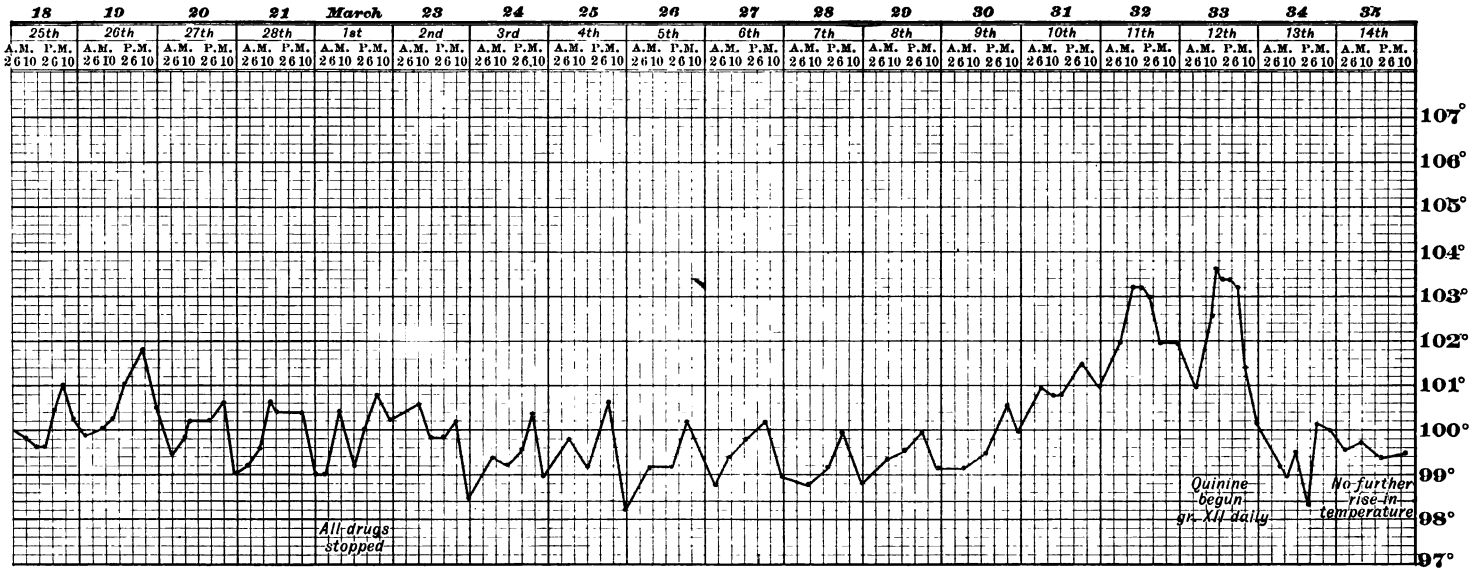
During the following day the temperature fluctuated between 101 and 105°. The urine was still very turbid from the pus and very much increased in quantity. Reaction still acid; sp. gr. 1005.

On the sixth day, February 13th, the urine was passed very freely, from sixteen to eighteen ounces in twenty-four hours; reaction still acid in spite of gr. xxiv. of the potash daily. The child's general condition was not quite so good as previously, although she showed comparatively little disturbance, considering how high the temperature had been. She was now taking about one-half the usual amount of food. The bowels moved regularly; there was no vomiting, and she slept a fair amount of time. There was no drowsiness, and the symptoms of irritation about the bladder had entirely disappeared. The temperature still fluctuated widely, rising from 98.5 to 106° in the course of two hours and falling again to 100.5° shortly afterward. The fluctuations in temperature were still irregular as to the time of their occurrence. When the rise was not preceded by a distinct chill there were nearly always cold hands and feet and pallor.

On February 14th the general condition remained about the same. The amount of potash now taken was fifty grains daily, and with this the urine was kept neutral or faintly alkaline. The amount of pus discharged was still very large, being about five per cent. of the vol-



ACUTE PYELITIS. CASE III. INFANT 9 MONTHS.


18 19 20 21 March 23 24 25 26 27 28 29 30 31 32 33 34 35
25th 26th 27th 28th 1st 2nd 3rd 4th 5th 6th 7th 8th 9th 10th 11th 12th 13th 14th
A.M. P.M. 2 6 10 2 6 10
107°
106°
105°
104°
103°
102°
101°
100°
99°
98°
97°
All drugs stopped
Quinine begun gr. XII daily
No further rise in temperature

ACUTE PYELITIS. CASE III. INFANT 9 MONTHS—(Concluded).

ume of the urine. It was estimated at from two to three ounces daily. The examination of the urine showed, besides the immense numbers of pus cells, renal epithelium, a little bladder epithelium and a very few granular casts, these mostly in fragments; stained for tubercle bacilli, but none found.

The case was seen this evening by Dr. John H. Ripley, who concurred in the diagnosis of acute pyelitis, but suggested, in view of the wide fluctuations of temperature and recurring chills, that another trial be made with the quinine, with the belief that there might be a malarial element in the case, although the spleen was not now enlarged, nor had it been so at any time during the attack. It was decided to give it in large doses for twenty-four hours, and then to stop it if no benefit was seen. At Dr. Ripley's suggestion the quinine was given hypodermically.

During the next twenty-four hours thirty-six grains of bi-sulphate of quinine were injected beneath the skin, and as no untoward symptoms were seen and the child was improved, it was continued. During the succeeding twenty-four hours twenty-four grains were given in the same way, and in the third twenty-four hours twenty grains, making in all eighty grains of the bi-sulphate hypodermically in the seventy-two hours. The injections were all given deeply into the buttocks and outer aspect of the thigh. No unpleasant local or constitutional symptoms were seen as a result of these immense doses of quinine.

From the time the quinine was begun, the wide fluctuations in the temperature ceased, and it ranged from this time between 101 and 103°. There were no more chills. In other respects there was little change in the condition of the patient. The potash was continued, twenty to twenty-four grains daily, and as much lithia water given as the child would take. Hot fomentations over the kidneys were continued.

The urine ranged from sixteen to twenty-two ounces daily, the amount of pus being about four per cent. by

volume of the urine passed. Microscopical examinations were made daily. The report of the examination of February 17th, by Dr. Walter Mendelson, is a good average of the urine at this time: Spec. grav. 1007; faintly alkaline; a small amount of albumen; urea 3.6 grams in twenty-four hours; urates, phosphates and chlorides diminished; a trace of blood pigment; no indican. Microscopical examination: immense numbers of pus cells, a few red blood cells, a few blood and epithelial casts, bladder cells and many bacteria.

From February 17th to February 22d there was a steady improvement in the general condition and in all the symptoms, the temperature gradually declining until on the 22d, for the first time, it did not rise above 100°. Hot applications over the kidneys and potash in sufficient quantity to keep the urine neutral or slightly alkaline were continued. The quantity of pus slowly diminished. There was still a trace of albumen, and now and then an epithelial or granular cast would be found upon microscopical examination. Frequent examinations of the abdomen were made, but at no time was there tenderness or tumor in the region of the kidneys. The quinine had been gradually reduced now to six grains daily, a part of which was still given hypodermically. During the two weeks' illness the child lost 1½ pounds in weight and cut three molar teeth.

On February 23d the temperature took a sudden jump to 103.5°; this was not preceded by a chill nor accompanied by any other general symptoms, and a careful examination revealed no explanation of this increased fever. The quinine was now increased to sixteen grains daily, all given hypodermatically for twenty-four hours, and the temperature was immediately controlled. The quinine was then reduced to eight grains daily for three or four days, and then finally to three or four grains.

On March 1st both the quinine and the potash were stopped, as the child seemed in all respects convalescent. She was now taking thirty-five ounces of food a day, had gained five ounces in weight and had a good appetite.

There was only a very faint deposit of pus seen by the naked eye, but under the microscope the pus cells were still abundant.

For the next ten days the general improvement continued, the temperature ranging between 99 and 100.5°.

On March 10th a temperature of 101.5° was again reached, but was attributed to a slight sore throat. On the following day the temperature continued to rise; and a careful examination was made, but did not reveal any sufficient cause for the increased fever. The urinary conditions remained unchanged or slightly improved.

On March 12th the throat symptoms had diminished, but the temperature had risen to 103.5°, and quinine was therefore again begun, this time by the mouth and rectum. During the succeeding twenty-four hours twelve grains were retained, with the effect of controlling the temperature. It fell at once to 100°, and thereafter remained below that point.

On March 14th the child was taken to Lakewood, the urine still containing a trace of albumen, many pus cells, but no casts; reaction acid; spec. grav. 1010. Eight grains of quinine were given daily for four or five days, and six grains daily were kept up for two weeks, after which it was stopped altogether. No further rise in temperature occurred, and the child improved rapidly in every respect, gaining in two weeks one and a half pounds in weight.

At the site of the hypodermic injections of quinine there are now over the buttocks and thighs twenty or thirty irregular lumps, of a slightly brownish color about as large as an almond. These are not tender or painful, and show no disposition to suppurate. They have only recently come to the surface.

May 15th: it is now over three months since the beginning of the attack. The child is in splendid condition, one year old, weighing 22¾ lbs. The urine has been examined at intervals of a few weeks since the last note, and has always shown a good many pus cells under the microscope, although in other respects it is normal. The

nodules upon the thigh still remain, but are slowly diminishing in size. The child is now taken to Europe for the summer.

September 1st: Reported as having been free from urinary symptoms since last note.*

Remarks.—Case I. was a simple one, of moderate severity, in which the diagnosis seems quite clear, and in which there is no reason to suspect any complication. There was a sudden onset, with a temperature of 103.5°, and an unexplained fever for a week, ranging most of the time between 100 and 102°. The urine was at first noticed to be scanty and high-colored, but no examination was made until the end of a week, when pus was found in large amount. The constitutional symptoms were only moderately severe. There was no evidence of any implication of the kidney, and the case made a prompt and complete recovery. There was nothing in this case to suggest a local cause, such as traumatism or calculus, balanitis or urethritis.

In Case II. the condition is a much more complicated one. The striking features of this case were a sudden onset with a chill, in a child who had been previously in perfect health and from birth under the close observation of one of the physicians, in fact living in the same house with him. For twelve days the temperature was steadily high, touching 105° almost every day, and on several occasions above this point, only temporary reduction being effected by baths. The early administration of quinine in doses of eight to ten grains daily had no effect whatever upon the symptoms. There was no evidence of local disease until the urine was examined on the eleventh day and found to contain a large amount of pus. With the administration of alkaline diuretics, and a great increase in the quantity of urine and the discharge of pus the temperature gradually fell, and after four days remained at the normal point. There seems to be no suspicion of malaria. The early administration of quinine had no ef-

* NOTE.—Specimen of urine Sept. 15th showed a considerable number of pus cells, but was otherwise normal.

fect whatever on the symptoms, and the temperature remained throughout steadily high, and not of remittent type. There were no evidences of vaginitis or cystitis. It is of interest to note that this case occurred at a time when grippe was prevalent in New York City, and it seemed not improbable that this may have been the etiological factor in the case. The occasional casts which were found, and renal epithelium, indicated that the kidney participated in the inflammatory process, but only to a very slight degree, as the rapid and permanent recovery of the case showed better than anything else. A surprising thing in this child was the absence of very marked prostration in spite of the prolonged high temperature. In fact, without the thermometer one would hardly have deemed the child seriously ill.

Case III. is in all respects a remarkable one. It resembles Case II. very closely in many particulars, in the age of the patient, the previous good health, the sudden onset with a chill, and in the excessively high temperature. What the exact etiology of this case was I am unable to say. The family history was a gouty one, and a grandmother of the patient has diabetes. An older child has been repeatedly under observation, with attacks of genital irritation accompanied by an excessively acid urine and the discharge of crystalline uric acid.

Were the recurring chills due to malarial poisoning, or were they septic? It should be remembered that this child had what would be considered very large doses of quinine during the first three days of the illness, but without any effect whatever upon the symptoms, and also that there was no enlargement of the spleen at any time during the attack. Furthermore that the child had never been exposed to any malarial poisoning, excepting such as may exist in the best residential portion of New York City. I regret that the blood was not examined. When the quinine was given hypodermically in the immense doses mentioned, viz. eighty grains of the bi-sulphate within three days, although the chills ceased, and the wide fluctuations in temperature were at once checked,

still a very decided fever continued and the disease itself did not seem to be affected. The effect of the quinine, it seems to me, admits of two explanations, the first that there was a malarial element in the case, and the second that the drug eliminated in such a large amount by the kidney had a marked antiseptic effect in the urinary tract. In view of all the facts I regard this explanation as more probable than the malarial theory.

In this case there was more evidence of implication of the kidney than in either of the foregoing, but even here the renal disease was evidently of very secondary importance. The amount of albumen was not more than would be expected from the quantity of pus present. The casts were few; and at many examinations none whatever could be found. A number of epithelial cells present was very much more distinctly of the bladder type, and others distinctly renal, with many intermediate forms between. It is now pretty well agreed that there is no peculiar epithelium in the pelvis, the form present being generally of the transitional variety.

In none of the cases reported was there any evidence of a local cause of the disease, either of traumatism or of calculus. In no one were there any previous or subsequent symptoms pointing to disease of the kidney, and in no one were there any minute calculi discovered at any of the examinations, although they were carefully looked for. In no case was there evidence of disease of the lower part of the urinary tract.

It seems difficult in view of the histories given to make any other diagnosis than that of acute pyelitis, arising probably from some infection carried to the kidney through the blood vessels. What the primary source of infection was it is impossible to say. That the pelvis of the kidney rather than the kidney itself should be affected also seems surprising, although the clinical course leaves no doubt in my mind that such was the case.

In conclusion I should like to call attention to the necessity of the examination of the urine in infancy in all acute diseases with doubtful symptoms. In a previous

communication to this Society I have reported a series of cases in which prolonged high temperature in infants depended upon an acute nephritis, apparently of primary origin. We must now add acute pyelitis to the causes which may give a very high temperature of a prolonged character.

DISCUSSION.

Dr. Osler stated that the absence of enlargement of the spleen and the failure of quinine to control the fever were sufficient to show that the cases were not of malarial origin. Just as in the adult, recurring chills with high fever and the occasional presence of pus in the urine may be the only symptoms of pyelitis in a child.

He gave the notes of a case of the kind which was under his care a few years ago: A boy aged four was admitted July 30, 1891, with attacks of fever and the intermittent presence of pus in the urine. The patient was the fourth child and had always been healthy. The illness began in April, 1891 with a sudden fever in which the range was to 102°. There was pain in the right side and the attack lasted about ten days. No note was made on the urine at this time. He was better for four or five days and then had severe chill in which the temperature reached 105°. This attack lasted for eight days. He then was better and went away for a trip on the lakes. On June 1st it was noticed that the urine contained some pus which had been present at intervals in small quantities since; no blood, tube casts, or albumin. For two months he had at intervals chills and sweating. In June he had no fever for two weeks, but once he had a little difficulty in passing water and complained of pain in micturition. Prior to this on one occasion the catheter had to be used. He has not infrequently complained of pain as the urine was passed. No tumor was found in the side. In the intervals between the feverish attacks he seemed pretty well and plays about, though he is a little weak and anæmic.

The urine on admission was turbid, yellow, acid, and contained numerous pus cells, forming a considerable whitish deposit.

In the first week of August the urine cleared; on the 5th he had a chill in which the temperature rose to 103°. The urine did not become more turbid afterwards. The bladder was examined carefully by Dr. Finney with a negative result. The condition was regarded as one of pyelitis. It was noticed at the time of Dr. Finney's examination that the prepuce was uncommonly tight, so

that the child was circumcised, from which time until the present (1894) the child has had no return whatever of the chills or of the pus in the urine.

The case has been very carefully observed by the father of the child, who is a physician of exceptional capabilities.

Dr. Seibert asked upon what he had based his differential diagnosis in the first case between purulent cystitis and pyelitis; and in the other case between purulent infection of the kidney and purulent pyelitis. In pyelitis pure and simple, without nephritis, there was only one possible way of infection, and that was from the bladder upward. Where the pelvis of the kidney was infected, not through the bladder, but through the kidney, it was impossible for the pelvis to be in a purulent condition without the kidney at the same time being infected. The very high temperature, the chills, and the character of the findings, especially the epithelial cells in the first case, had given him the impression that there might have been a cystitis. In the other cases purulent infection of the kidneys was certainly not excluded by any of the symptoms or findings.

Dr. Caillé asked Dr. Holt if he were positive that there was not a vulvo-vaginitis in the female cases, as this was the usual way of infecting the bladder and kidney.

Dr. Holt replied that he was positive.

RAPID ABSORPTION OF CARBOLIC ACID BY AN ECZEMATOUS SKIN (Case).*

BY SAMUEL S. ADAMS, M.D.,
Washington, D. C.

C. H., white, male, aged seven months, was admitted to the Children's Hospital, May 6, 1894. The family history was without hereditary taint. The child was delivered without artificial aid and was well developed and healthy. In December last an eczematous eruption appeared upon the scalp and rapidly extended over the entire body. During the past six weeks numerous boils have appeared upon different parts of the body. The serous discharge was very profuse at times, when he would become stupid. His appetite has always been good, but constipation has been so obstinate that nearly all of the so-called infant foods have been given to overcome it—with the usual result. During all this time the irritation has been so intense that two nurses have guarded him day and night to prevent him from scratching. His sleep has been greatly interfered with by this itching.

Present Appearance.—Small, anæmic, no teeth, no rachitis, and sutures and fontanelle open. The eczema is spread over the entire surface and varies from scales to pustules. In many places the serum exudes freely and in others are boils of different sizes. The intense itching keeps him in constant motion, even during sleep. His food consists of a mixture of Mellin's Food, condensed milk and water, which he is now drinking.

There was no history of convulsions, but he frequently gave evidence of unusual excitement during his efforts to scratch.

At 1 P.M. I had him stripped and photographed, but the negative is of little value owing to our inability to keep him quiet. While this was being done he managed to scratch the blood from head, face and body.

His diet is to be Pasteurized cow's milk ℥ vi., barley water ℥ ii., lime water ℥ i., and granulated sugar ℥ i.;

* Read by title.

and the maximum number of feedings in twenty-four hours six.

A poultice of stale bread and carbolized water (1-40) was ordered to be applied to remove the scales and crusts and to allay the intense itching. The patient was enveloped by the warm poultice, which seemed to sooth him. In about three minutes the nurse—who had never left the crib—noticed a sudden and alarming change in his condition, and summoned the resident physician. This officer's report is about as follows: Child completely cyanosed, breathing stertorously, and mucus vibrating in larynx with each respiratory act; pupil contracted to size of pin-point, conjunctiva does not respond to irritation, and general reflex action is abolished. The arterial tension was increased at first, but soon diminished, and the pulse became thready and intermittent. The rectal temperature is 97° F. He had the poultice removed. Bottles of hot water and hypodermatic injections of whiskey were used to induce reaction. Syrup ipecac. was administered to try to remove the tenacious mucus, which interfered with the respiration, but he was unable to swallow it; the finger was then passed into the larynx and stringy mucus removed. Artificial respiration was also used.

I was immediately notified and was at his bedside within half an hour from the onset of these symptoms. His condition at this time was very alarming, but showed slight reaction. The hot pack was to be continued and ten drops of whiskey ordered to be given every three hours, or oftener if necessary. In about an hour from the onset he began to sweat profusely, and consciousness was partly restored. After prolonged efforts he vomited a small quantity of blackish fluid, which proved not to be blood. I saw him three times during the afternoon and noted the gradual reaction.

10 P.M.—Consciousness is restored, reaction is complete, and he has passed a small quantity of dark urine. Several black patches, varying in size from a ten-cent piece to a silver half-dollar, are seen on back of head and occupy the location of scabs.

May 7th.—This morning the child seems well with the exception of slight drowsiness. There seems to be an anæsthesia of the entire cutaneous surface, at least he has not scratched since the poultice was applied.

Local treatment was ordered for the eczema and within two weeks he was practically well, but three months later died of entero-colitis.

COMMENTS.

I am impelled to report this case for many reasons—the principal of which is that others may profit by my experience with an almost fatal case of carbolic acid poisoning.

When I first saw the child in his moribund condition three conditions presented themselves to my mind, any one of which might produce the same line of symptoms.

1. Was the child suffering from an eclamptic seizure, due to some irritant in the intestinal canal? This was possible, especially as he had been improperly fed and was habitually constipated. As refuting such belief there was the absence of corroborative evidence of tonic or clonic contractions.

2. Was it a congestive chill produced by exposure during the time the photograph was being taken? While the coma, subnormal temperature, and apparent congestion of internal organs might point to such condition, chilling would hardly seem possible since the temperature of the room was above 80 F., and the time of exposure very short.

3. Was it carbolic acid poisoning, due to the rapid absorption of the drug by the eczematous skin? While either of the other conditions was possible, nevertheless the weight of evidence pointed to the acid as the exciting cause, and the diagnosis was unquestionable when the black urine was voided. The rapidity with which the drug was absorbed refutes the old idea of the non-absorptivity of the skin when covered with scales, crusts or scabs. I had applied the same treatment in other cases—some still younger—without such accident, but after such an experience I shall be more cautious hereafter. The child's mother, after the excitement was over, admitted that several others had tried carbolic acid before his admission to the hospital, but "it invariably made him worse." Had this fact been brought out in his previous history the parents, physicians, nurses and myself would have been spared hours of watching and anxiety.

RICKETS IN NEGROES.

BY GEORGE N. ACKER, M.D.

Washington, D. C.

The negro race presents so many peculiarities, and there are such physical differences between it and the white race, that it is surprising that a special work has not been written upon the medical features of the race. In the Surgeon General's Library, there are numerous works relating to the negro, yet none of these make mention of rachitis as being a disease observed among them. Though not recognized by Southern writers before the war, (and no article has appeared since on the subject) yet from the fact that we are told that indigestion, bowel troubles, etc., resulting from improper food, and the infants being nursed by mothers overworked, and tired, were common; also that the children suffered from enlarged glands, and bowed legs, we must assume that the disease was prevalent even in slave times. Since the war the race has been placed under entirely new conditions. It was to the interest of the master to see that the young were well taken care of, and from all accounts ample provision was made to reduce the mortality among the children. The slaves were fed on food most conductive to their healths. Good warm clothing was provided. They had healthy homes and regular hours of work. Care was taken of them when sick, and their wants were attended to Thus the parents were most likely to produce healthy offspring. Even under such favorable circumstances it is stated that so-called scrofulous diseases were frequent.

Since their emancipation the negroes have been compelled to take care of themselves, and look after their own interests. Any one who has been brought in contact with them knows of their shiftless, improvident ways. Being

placed on their own resources and without any restraining influences they suffer from intemperance, impure air from overcrowding and want of ventilation, and insufficient clothing. They live in the most unsanitary parts of the city. The food they obtain is not always of a suitable character, being scanty, of poor quality, and innutritious. If left to themselves they exhibit a total disregard for the laws of sanitation and hygiene and are thus exposed to all diseases arising from such causes. This without a doubt has a deleterious effect upon the offspring. The race is undergoing serious physical decay. This is the report from all over the country, and is not confined to any one locality. This is true of the country as well as of the city, and is due to inherent weakness or physical degeneration, and not to any special fault in the environments.

The negro naturally occupies the lowest stratum of society and is consequently subjected to the deteriorating influences that attach to indulgence and low propensities. His stamina or power of resistance to disease is therefore more or less defective as a general rule.

Negroes are almost without exception rachitic. This predisposition to rachitis in the colored race would seem to be an acquired one, for it is stated that the native African seldom, if ever, shows any evidence of the disease. It is impossible for me to give the number of cases of the disease observed during the year in our hospital and dispensary practice, as we do not enter the patient with the diagnosis of rachitis unless the disease is very severe. The case is usually admitted for some acute trouble of the digestive and respiratory organs or tuberculosis and treated under that diagnosis. The rachitic condition is recognized and recorded in the notes. Therefore anyone consulting our reports would not imagine that the disease was a common one. The diagnosis can be easily made in the negro if one searches for evidences of the disease. It is a general disease and not always recognized in its earlier stages, for many wait for the bone lesions which are often late, and not always prominent. Some severe cases are thus overlooked.

Among the most active factors in producing this disease in the negro heredity plays an important part. The parents as a rule are tuberculous or syphilitic—no doubt an accurate history of their infancy would show that they had been rachitic. Eustace Smith writes that rachitic children may become tubercular but a child in whom the tubercular diathesis is marked never, he thinks, becomes rickety and that rachitis is rare also in the syphilitic diathesis. My experience with the disease in the negro would tend to prove just the opposite.

It is common to find children with the tubercular and syphilitic diathesis develop severe cases of rachitis. Venereal disease is common among the negroes, and hereditary syphilis is frequent. This affects the nutrition of the infant and rachitis results. The state of the parent's health has a potent effect in the causation of the disease. Another predisposing cause is breathing bad air in small, damp and dirty habitations as most of the negroes live in ill ventilated and unsanitary houses. The assimilative functions of the infant become impaired from breathing the vitiated air, and being deprived of sunshine. The child also suffers from the want of care and cleanliness.

If the infant is breast-fed it often suffers from the imperfect quality of the mother's milk due to poor circumstances. The most of the mothers are in service, and do not nurse the infant at regular hours. During their absence at work it is given other food and thus is prematurely weaned; condensed milk is the favorite substitute for the mother's milk. Table tea is also given here to a great extent in place of plain milk. In fact it is sometimes difficult to get the little patients to take milk as they prefer the tea. The cheap adulterated mixture sold for tea is enough in itself to cause indigestion and consequent malnutrition. The negro infant is weaned at an early age, even when its mother is able to nurse him. Long before dentition the infant is given such food as the mother eats.

The following case will illustrate this:

M. A., black æt. six months was brought to me several weeks ago on account of being fretful, nervous and easily

awakened. It also was subject to colds and has heavy sweats when it sleeps. The ribs are slightly beaded, and wrist joints enlarged. It is a lively, bright-looking infant. Until the third month when the mother gave up nursing in order to go in service, it was in a good condition. Since then it has been fed on condensed milk, oatmeal, beef-tea, bread and butter and table tea. The mother is a strong, healthy woman nineteen years of age.

On account of its surroundings the infant is exposed to changes in temperature and liable to diseases of the respiratory organs. Robt. J. Lee, of London, regards pulmonary disorders as the cause of rachitis. By the term pulmonary disorder he means any cause by which the physiological process of respiration and its effects upon the circulatory system are more or less interfered with. Between the sixth and eighteenth month pulmonary disorders are very common and this is the time of life we observe the rachitis. While I do not endorse this view in regard to the ætiology of the disease yet we must admit that diseases of the respiratory organs lower the tone of the system and make more pronounced the various lesions we find in rachitis.

The change of climate does not appear to have any influence in the production of the disease as it is found to be common among the negro children all over the United States.

In the negro affected with rachitis we find about the same pathological changes as in the other races. Some lesions are more pronounced than in the whites, such as enlarged wrist-joints, and deformities of the long bones, especially the bending of the tibiæ. Softening of ribs comes on early and is constant. It is always a source of danger owing to the impediment offered to free respiration. Beading of the ribs—rachitic rosary—is well pronounced, and the thoracic grooving marked in all cases. The liver of the negro is stated to be larger than in the whites. This, together with the large abdomen found in the infants, makes this feature more prominent. The majority of the cases are pigeon-breasted.

The head in nearly every case has the rectangular ap-

pearance (caput quadratum), the sutures and fontanelles are slow in closing. This is not constant for in some cases the fontanelles close early and the skull becomes hard. I have not been able in any of my cases to find the soft spots—craniotobes—upon which some rely in making a diagnosis in the earlier months of the disease. I have made a careful search for this lesion, yet must confess that I have not succeeded in detecting the condition so that I must conclude that this is rare in the race.

The teeth are irregular in erupting. They are generally cut without any difficulty. The incisors are often notched and decay early. The normal position of the permanent teeth do not appear to be affected by the irregular way the temporary ones make their appearance as it is the rule for the negro to have good regular teeth.

One of the more prominent early symptoms in negro children is the sweating which occurs about the head principally, especially when asleep. It is stated that the negro has a greater number of cutaneous glands than the white; on this account this symptom is more marked in them.

Extreme baldness of the occiput is often produced by the infant rolling its head from side to side. The intelligence is usually precocious. Negroes have less nervous sensibility than the whites and are not as a rule subject to nervous affections. I have in my practice seen but one case of laryngismus stridulus in a negro rachitic subject. The disease is rare among them. The bowels are irregular. They suffer greatly from indigestion, and have loose offensive stools. When placed upon proper food the digestion rapidly improves and the bowels become natural.

Bronchial catarrh and broncho-pneumonia are common and most of our cases are admitted for these diseases. Tuberculosis is the gravest complication and proves fatal to a large number of infants.

In order to diminish this disease among the negroes our efforts should be directed to its prevention. We must improve the sanitary condition of the parents. Instruct

them to eat good nutritious food ; the study of the laws of hygiene should be made obligatory in all colored schools. It will be impossible for medical skill or charitable aid to lessen the fearful mortality of the negro until he becomes conscious of the fact that he is dying almost doubly as fast as the whites. In this way we could accomplish a certain amount of good, for the parents would improve in health and thus tuberculous affections be restricted. Syphilis would be harder to control as the negro does not suffer to the same extent as the whites from the effects of this disease.

The mothers should be taught to nurse their young until the proper time for weaning, or if it is necessary to wean the infant to ask the advice of a physician so that a proper substitute for the mother's milk can be prescribed. They should be encouraged to visit the dispensaries for this purpose. If properly prepared milk at a low price could be furnished them it would be a great blessing, and prevent much sickness. This is a serious subject for consideration, and should engage the attention of the health authorities, for we now have a prolific race of unhealthy, degenerated beings who will prove a menace to the interests of the country.

The infant should be protected as far as possible from changes in temperature, and have good warm clothing. This would lessen the danger of catarrhal troubles of the respiratory system. The skin should be kept in good condition by salt-water baths. All measures which tend to improve nutrition are beneficial. Where we have reason to think there is a tendency to the disease, treatment should be commenced early. Cod-liver oil (we give it here in the form of emulsion) in the winter, and hypophosphites in the summer.

When the child is placed under favorable circumstances the disease usually yields to treatment.

THE ETIOLOGY OF TETANUS NEONATORUM.*

BY J. LEWIS SMITH, M.D.

Clinical Professor of Pediatrics in Bellevue Hospital Medical College, New York.

Several years ago Humboldt wrote that there is no subject in the whole range of scientific investigation more obscure than the causation, and spread of the acute infectious diseases. Humboldt did not live long enough to witness the wonderful discoveries by the microscope and the light thrown by this instrument on the obscure subject which puzzled him, whose investigations embraced the whole universe.

In the decade commencing with 1880, the bacillus which causes tetanus was discovered by the conjoined labors of distinguished bacteriologists among the earliest and most successful of which was Nicolaier, so that the bacillus was at first designated by his name. In November, 1886 Rosenbach produced tetanus in two guinea pigs by inserting under their skin, small portions of gangrenous material from the ulcer of an individual having tetanus. He also demonstrated the fact that the bacillus of Nicolaier is capable of causing tetanus in animals. These discoveries excited great interest, and were soon followed by the important chemical researches of Brieger, by which he isolated a toxine occurring in the cultures of the bacilli of tetanus and generated by them. This toxine has the formula C. 13, H. 30, Az. 2, O. 4, and it produces tetanus when injected under the skin of an animal susceptible to this disease, while the bacilli deprived of their toxines by filtration are inert. Brieger also states that he extracted from the same cultures two other toxines of great activity which he designates tetanotoxyne and spasmotoxyne.

* Read by title.

The setting free of these toxines was accompanied according to Brieger with the disengagement of sulphuretted hydrogen. Bacteriologists describe the bacillus of tetanus, as having twice or thrice the length of the tubercular bacillus but thicker and straighter, and knobbed or enlarged at one extremity, so as to be designated pin-shaped. Bonome among others made microscopic examinations and cultures of this bacillus obtained from the wounds or sores of human beings, horses and sheep. Among micrococci and bacilli of various sizes and forms he observed the constant presence of the fine bristle-shaped, pin-headed bacillus identical with that described by Nicolaier. Bonome endeavored in vain to obtain pure cultures of the bacillus and concluded that it did not thrive except in company with the germs of putrefaction.

TETANUS.
(After Currier.)

The recent cultivation of the tetanus bacillus in the laboratory of the chemist, is a fact of great interest, and one that throws light on the causation of tetanus, whether in the infant or adult. The process is described by Mr. R. T. Hewlett, demonstrator of bacteriology, in King's College, in the *London Lancet*, July 14, 1894, as follows. "In order to obtain the chemical products for inoculation, and other purposes, the bacillus of tetanus may be grown without the use of any complicated apparatus in an atmosphere of hydrogen, in the following manner: Yeast flasks of about 90 c.c. capacity are made use of and are filled three parts full with a two per cent. grape-sugar bouillon. The neck is corked with a perforated rubber cork (Fig. 2 A) through which a glass tube (B) passes to the bottom of the flask, projects two inches above the rubber cork, and is plugged near its top with cotton wool, care being taken that the plugs are loose enough to allow air to pass freely. The whole is sterilised and inoculated. The glass tube (B) which passes through the rubber cork, is then connected with a Kipp's or other hydrogen-generating apparatus by means of a rubber tube, and a current of hydrogen is passed through the flask. The hydrogen bub-

bles through the bouillon, and escapes by the lateral tube. After the gas has escaped for about an hour a small capsule containing mercury (D) is applied to the end of the lateral branch, so that the open end just dips below the surface of the mercury, and the tube (B) which passes through the rubber cork is sealed off in the blow-pipe flame, care being taken that all the air has been expelled from the flask by a free current of hydrogen. The flask with the capsule of mercury applied to the end of the lateral branch, can then be placed in the incubator. Thus the mercury forms a valve; air can not enter while gases formed by the growth of the organism have free exit." By this simple apparatus the bacillus of tetanus is grown in the flask of the chemist, in an atmosphere of hydrogen. Air or oxygen is totally excluded, this microbe being anærobic.

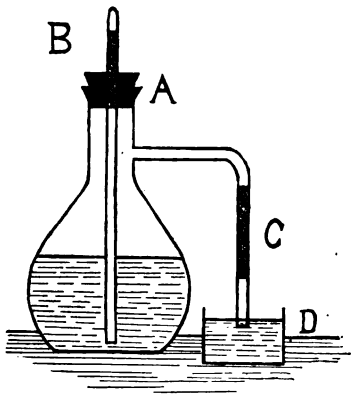


FIG. 2.

Prof. Wm. H. Welch, of Johns Hopkins University, in his address before the Amer. Med. Asso., at Newport, June 28, 1889, said: "Among the pathogenic bacteria, which have their natural home in the soil, the most widely distributed are the bacilli of malignant œdema, and those of tetanus. I have found some garden earth in Baltimore extremely rich in tetanus bacilli, so that the inoculation of animals in the laboratory with small bits of this earth, rarely fails to produce tetanus."

The fact as stated by Prof. Welch, that the bacillus of tetanus has its natural home in the soil, throws light on many interesting observations, which have been recorded in the literature of tetanus. Several years ago that large part of New York Island, now occupied by the Central Park, and between the Central Park and the Hudson River, was occupied by the laboring class, living in shanties of the simplest construction. The streets were not

sewered, and refuse matter from the shanties and stables, the two being often built together, was dumped upon the open spaces. The stables were occupied by horses and cows. As might be expected these simple and primitive domicils, and their surroundings were filthy as were the habits of most of the families. Tetanus neonatorum was not uncommon in this locality, I recollect that in one of the shanties in this locality two infants died at an interval of about fifteen to eighteen months. These observations correspond with the fact, that many have stated, that the bacilli of tetanus thrive best among the germs of putrefaction and in a soil mixed with the excreta of horses.

Another fact showing that the soil is the natural home of the tetanus bacillus was observed some years ago by surgeons of Bellevue Hospital. The surgical patients entering this hospital from a certain part of Long Island were very liable to have tetanus at the time of entering, or to manifest it soon after.

There are or have been localities in every climate, where tetanus neonatorum was the most prevalent and fatal of the infantile diseases. The bleak and barren islands of Hiemasy and St. Kilda, in the far north, nearly destitute of vegetation, and with guano for fuel, probably containing the tetanus bacillus, the dirty negro cabins of the Southern States, Fulda, Demerara, and Bombay, may be mentioned among the places, where tetanus neonatorum is or has for lengthened periods been so common as to materially check the increase of population, and afford evidence of the correctness of the theory, that the natural home of this bacillus is the soil.

The fact familiar to army surgeons, that after certain sanguinary battles, the wounded who have fallen to the ground, have been very liable to tetanus is most satisfactorily explained on the supposition that the soil of the battle field contains the specific microbe. Sometimes tetanus follows injuries which are not attended by any breach of surface, through which the bacillus could enter, and in some instances the intervals are so short between the injury and the commencement of the tetanus, that it

seems very improbable that the tetanus could be due to the agency of the bacilli, but rather to injury of the peripheral nerves and consequent excitation of the reflex spinal system. Thus cases have been reported in which only 24 or 12 hours, or even a shorter time elapsed between the injury and the tetanus, too short a time, it would seem for the development of bacilli. In studying the causation of tetanus whether of the neonati or of older patients, we should not overlook the fact that there is a form of the disease designated puerperal of which form the late Sir James Y. Simpson, collated the histories of over 20 cases (see Simpson's Obstetrical and Genæcological works, Vol, 1.) Puerperal tetanus occurs after abortion or labor at term, or after intra-uterine operations, and is probably correctly attributed to decaying animal tissue which excluded from oxygen generates hydrogen and other poisonous gases. Such cases have given rise to the opinion held by some that the germs of tetanus are occasionally received into the system by inhalation, and are developed in the putrid substance with which they come in contact. Another theory held by some distinguished specialists in nervous diseases, is that exposure to cold is an important cause, and is sufficient in itself to produce the disease. Hence Gower states that there is a variety of tetanus which is caused by exposure to cold, and which he designates idiopathic or rheumatic. By this theory it is easy to find an explanation for the origin of cases of tetanus neonatorum, several of which have been reported, in which, the umbilicus and its vessels seemed normal, and there was no injury of the cutaneous surface. In my opinion the time is not far distant when the bacillus of tetanus will be regarded as the cause of endemic, epidemic, and a large proportion of single cases. Occurring without traumatism, or any appreciable cause, we may accept the theory of Gower, that in these cases of obscure origin the cause is "taking cold." But it seems to me not unlikely that the investigations in reference to the causation of tetanus, may end in a similar way to those in regard to diphtheria; that is, that true tetanus is always pro-

duced by the bacillus of Nicolaier, but there is a spastic muscular contraction in infancy as well as in adult which is due to a cause or causes distinct from the bacillus.

In examining the literature of tetanus, it is evident that the tonic contraction of the muscles in certain cases, which has been supposed to indicate the presence of tetanus, has been due to spinal or cerebro-spinal meningitis and not to tetanus. Thus Billard reported a case in which tonic contraction of the muscles occurred in an infant three days old, and the anatomical characters observed after death were those of spinal meningitis. That tonic muscular contractions frequently occur in infancy and childhood in consequence of meningeal inflammation is well known, and in some of the epidemics reported as tetanus, meningitis was present and was doubtless the cause of the muscular contractions. Such an epidemic was observed by Prof. Cederschjold in Stockholm in 1834. Within a few months he treated forty-two cases, and in the bodies examined after death, he found a fibrinous exudation at the base of the brain. I see no reason to doubt that the epidemic, which he describes as one of tetanus, was one of cerebro-spinal fever, more frequently designated cerebro-spinal meningitis.

THE NUTRITIONAL ELEMENT IN THE CAUSATION OF NEUROSES.

BY W. S. CHRISTOPHER, M.D.

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At the last meeting of this Society Dr. Rachford, in a paper on Incontinence of Urine, called attention to a triad of conditions which he claims exist in varying degree as causative factors in all neuroses.

This triad of the etiological factors of neuroses is as follows:

1. Heredity.
2. Anæmia.
3. Some local condition acting reflexly as the immediate exciting cause.

Whatever view may be taken as to the truth or completeness of Dr. Rachford's generalization, he is entitled to great credit for having attempted a classification of the etiological factors of neuroses, for it is only by the aid of such generalizations that a comprehensive conception of individual cases can be had.

It seems to me that the term anæmia is badly chosen, and indeed, Rachford himself, while laying special stress on the condition of anæmia, distinctly states that the real factor is malnutrition, but claims that oligochromæmia, and oligocythemia, are, ordinarily, satisfactory indices of this condition.

Instead of the term anæmia, I think the term malnutrition, should be used. Incomplete nutrition of individual organs may be caused by other conditions than the deficient nutritive quality of the blood. Moreover, we cannot escape the belief that there are many changes which occur in the blood, affecting its nutritive value, but

which we cannot determine clinically. As a matter of fact the estimation of hæmoglobin, and numbering the corpuscles are about the only methods of blood examination which are available clinically, and so far as they go these examinations are of great value. But it can hardly be contended that these two factors constitute a satisfactory measurement of the nutritive value of the blood.

Furthermore, neuroses occur in individuals who are not deficient in hæmoglobin. A striking instance of this kind has recently come under my observation. The patient, a boy of four years, has a good heredity, except that his mother is slightly migrainous. He presents three well-marked neuroses: 1st, Indistinct articulation with occasional stammering. 2nd, Periodical incontinence of urine. 3d, A recently acquired bad temper. And this boy's blood is 110 on Fleischl's scale. A single example like this is sufficient to show that anæmia is not essential to the production of neuroses, or rather that oligochromæmia is not always included in the nutritional perversions underlying neuroses.

It is the object of this paper to inquire into the various conditions affecting nutrition, and analyze, so far as possible, the influence of these conditions in the production of neuroses.

The manifested functions of a tissue are the resultants of the chemical changes occurring in it, and these changes are directly dependent upon the chemical composition of the tissue, and the conditions influencing its reactions, or in other words, the environment of the tissue. The chemical composition of a tissue depends directly upon its nutritive supply, and indirectly upon the trophic nerve influences governing it, but more particularly, as we see it in actual life, upon the former of these two conditions.

At this point let me offer a provisional definition of a neurosis, a definition which we shall see subsequently must be contracted. A neurosis is the group of phenomena resulting from the abnormal action of a tissue or tissues.

Under this definition the etiological factors of any neurosis must be comprised within these two general conditions : 1st, Abnormal chemical structure of the tissue. 2nd, Abnormal environment of the tissue.

It seems that the conditions of abnormal tissue environment may all be included under the following heads :

I. Abnormal composition of the nutritive elements in the contiguous fluids, leading to abnormal chemical reactions with the tissue, and producing chemical malnutrition.

2. The occurrence in the contiguous fluids of toxic substances, capable of acting directly upon the tissue, with resulting manifestation of abnormal function.

3. Physical conditions interfering mechanically with the supply of nutritive fluids, or, like heat and cold, modifying the chemical reactions.

4. Derangement of nerve influences, both trophic and function governing.

From this analysis it is evident that the foregoing provisional definition of a neurosis includes more than is ordinarily accepted as falling under that term. It would include, for instance, the manifestations of all intoxications, lead poisoning, morphia poisoning, septicæmia, etc. It would include insolation. This is unquestionably an undesirable extension of the term. The definition must be restricted so as to exclude the toxic and physical elements of tissue environment, while including the nutritive and nervous elements. This makes the definition read as follows : A neurosis is the group of phenoma resulting from such abnormal action of a tissue or tissues as may be dependent upon one or more of the following conditions :

1. Abnormal chemical structure of the tissue.

2. Abnormal composition of the nutritive fluids supplying the tissue.

3. Derangement of nerve influences.

It is evident that the individual factors comprised in these three groups exert very different degrees of influence in different neuroses. For instance, neuroses in-

volving muscular tissue are in all probability, much more dependent upon deranged nervous influences than upon an abnormal nutrition of the tissue exhibiting the neurosis, while the opposite condition would obtain where the neuroses involve glandular structure.

A consideration of these groups of immediate causes of neuroses leads at once to Rachford's three groups of tangible causes, except that it forces us to drop Rachford's term anæmia, and substitute for it the more comprehensive one, perverted nutrition.

The term partial starvation is one to which I shall have occasion to make reference, and a few words as to the sense in which it is used may not be out of place. Each individual requires not only a certain bulk of food, but also a variety. Not merely variety to gratify the palate, but variety to meet the various chemical requirements of the organism. The kinds of food needed are rather roughly classified into proteids, carbohydrates and fats. But these classes of foods, while they unquestionably supply the great bulk of the needs of the organism, do not do so completely. Aside from water and common salt there are probably very few other mineral substances which act directly as foods; inorganic substances generally needing to be in organic combination to be assimilated. The nutritionally necessary anti-scorbutic element has as yet escaped detection by the chemist. Concerning it we know these points: That it is needed in comparatively small quantity; that it may be withheld for a considerable time without apparent detriment to the individual; that this deficiency may be made up later; that the substance occurs in certain foods, particularly fresh fruits, fresh green vegetables and fresh milk. That which we designate as the anti-scorbutic element is possibly not always the same thing. It is probably, moreover, a type of numerous other nutrition units, as yet undifferentiated, which are more or less essential to complete nutrition, but which are required in but small amounts and may be supplied irregularly after more or less prolonged intervals.

While all proteids are foods, it is too much to suppose that all proteids are equally available as foods, or that they all play the same rôle in the organism, supplying the same nutritional wants. The proteids of beef and milk differ chemically, and probably do not exactly overlap each other in their supply of the needs of the organism. It is not probable that even any two meats, beef and mutton, for example, are exactly interchangeable. Milk supplies all the needs of the infant organism as we understand them at present. Several proteids are found in this substance. This fact is of prime importance because it indicates that this variety of proteids is necessary to the complete nutrition of the infant organism. An individual whose food is properly adjusted as to kind, but is insufficient as to quantity, may be said to be suffering from complete starvation irrespective of the degree of that starvation. Incomplete or partial starvation, on the other hand, occurs when the food is deficient in variety, when one or more of the essential elements of food is entirely withheld or supplied in insufficient quantity over a time long enough to produce changes in the structure of the organism, and this may occur, and usually does, when the total quantity of food ingested and assimilated is apparently fully sufficient for the needs of the organism. It is obvious that both complete and incomplete starvation may occur in a given individual at the same time.

These kinds of starvation are, moreover, largely relative. The idiosyncracies of the individual, probably of hereditary origin, have an important influence. A food supply which is perfect in quantity and quality for one child, is not necessarily such for another child of the same age, under the same environment. I have seen in the same family one child pass through a given period of its life with a supply of fat which would ordinarily be considered insufficient for the nutrition of any child, and yet show no evidence of fat starvation, while the next child, with much more fat food than the former, at the same period of life, showed distinct evidences of fat starvation.

Partial starvation is the great nutritional element in the production of neuroses. Partial starvation occurs very commonly. It is at times noticeable in adults, but much oftener in infants. In an infant in whom there is progressing the wonderful and complex processes of growth and development of the various organs and tissues, both in structure and function, it is readily conceivable, how even slight and not very prolonged deviations from the nutritional requirements of food supply, may show deviations from the normal.

The earliest noticeable deviations are necessarily functional, and therefore come under the term neuroses. Neuroses in which some perversion of nutrition is apparently the predominating etiological factor, may, with some degree of propriety be termed nutritional or starvation neuroses.

It is well to remember that a starvation neurosis is not always due to interference with the nutrition of the nervous system, for it is conceivable that a normal nerve impulse acting upon a tissue whose chemical composition has been perverted by interference with its nutrition, may call into action an abnormal function, *i. e.*, a neurosis.

Neuroses resulting from incomplete food supply, caused either by deficient feeding, or interference with the physiological progress of the food on its way to the ultimate tissues, may be termed physiological nutritional neuroses, in contradistinction to others, which may be termed pathological nutritional neuroses, and which result from perversion of nutrition caused by the presence of toxic, parasitic or morphological disease in the body. As examples of this latter class of causes I wish merely to mention here, syphilis and tuberculosis, without entering into any discussion of them.

The commonest form of partial starvation met with in infancy is fat starvation. And this is not to be wondered at when we realize that relatively the infant requires three times as much fat as the adult, and that actually the one-year old infant needs three-fourths as much fat as a grown man. Compare these ordinary requirements

with the commercial infant foods which are so largely used, and the wonder is that any artificially fed infant escapes fat starvation. All infant foods containing dried milk solids are deficient in fat, because some of the cream must be removed before the milk can be successfully dried.

Fat starvation is the commonest cause of rickets, and a large percentage of the cases of rickets can be entirely cured by merely making up for the fat deficiency in the diet. It is much less common to find proteid starvation, but occasionally it is met with, and rickets as its result.

Rachitic children are notoriously liable to neuroses, the commonest being profuse sweating about the head. So deeply impressed have I been with the idea that excessive sweating is often a fat starvation neurosis that I have come to regard many of the cases of sweating in phthisis as due to the same cause.

The principal neuroses of rickets other than sweating, are laryngismus stridulus, general convulsions and night terrors. Occasionally very odd neuroses are met with, as dysphagia, or retention of urine, or dysuria, resembling that produced by stone in the bladder.

The form of partial starvation resulting in scurvy is not infrequently met with. I have always met it in connection with rickets, and whether it gives rise to specific neuroses of its own, I am quite unable to say*. Many badly nourished infants are met with, which cannot be classed accurately as either rachitic or scorbutic, but they evidently represent some form of partial starvation. Our knowledge of the nutritional requirements of the infant organism for mineral substances is very deficient. When we recall that the muscles are particularly rich in potassium, and the blood and most other fluids in sodium, and that the ultimate chemical analyses of the several glandular organs show the greatest variations in the requirements of these organs for different mineral sub-

* Since sending the manuscript of this paper to the printer I have met with a well marked case of scurvy in an infant six months old, who was free from even the slightest evidence of rickets, and who presented no neuroses.

stances, we are compelled to admit that our knowledge of the finer points in nutrition is sadly incomplete. It can hardly be doubted but that there are such things as potassium starvation, and calcium starvation, and chlorine starvation and sulphur starvation, and phosphorus starvation, etc., and that each has its peculiar symptoms and neuroses. But we cannot recognize them yet. It has been suggested by Dr. William A. Evans, of Chicago, that in view of the rôle played by calcium salts in coagulation of the blood, it is probable that some of the purpuric diseases, are instances of calcium starvation.

It seems to me important to recognize the possibility of various partial starvations, caused by deficiency in the supply of organic proximate principles, and of the various so-called inorganic elements which enter into the composition of the body.

The most baneful effects of partial starvation are to be found in the infant, because its tissues are undergoing the most rapid changes chemically. The growth and development of an organ means not only an increase in size, but also the establishment and development of function, and development of function can only mean gradual change in the chemical constitution of an organ, or of its governing nerve centers.

But interference with food supply is not the only condition tending to the production of depraved nutrition of tissue. Many other factors interfere with constructive metamorphosis, among which may be mentioned abnormal trophic nerve impulse, long continued direct toxic action, auto-intoxication, and pathological conditions affecting the organism as a whole, such as constitutional dyscrasiæ, syphilis, scrofula,* etc., and the infectious diseases.

Time forbids any discussion of these points, but I cannot refrain from calling attention to one of them. It is not uncommon to find epileptiform convulsions proceeding from chronic stercoræmia in early life. These

*The word scrofula is used here to mean a pretubercular condition—a soil adapted to the growth of the bacillus tuberculosis.

convulsions disappear as soon as and as long as the bowels are kept non-toxic, but recur when attention is relaxed. When neglected, the frequent recurrence of the convulsion establishes a so-called habit, and the individual becomes ultimately a true epileptic. Such a habit neurosis is probably due to a permanent nutritional chemical impress made upon the developing brain by the long continued poisoning.

The numerous causes leading to depraved nutrition by way of augmentation of retrograde metamorphosis are entirely beyond the scope of this paper.

Heredity, which has been so much discussed in relation to the development of neuroses, besides its mode of action as ordinarily considered, has certain nutritional features which must be briefly discussed. Whatever theory we may adopt as to the nature of heredity, it will probably be admitted that specific morphological features result from more or less immediate hereditary impulse, and as function precedes structure, it seems impossible to escape the conclusion that the chemical constitution or structure of individual tissues is also determined, originally at least, by hereditary impress.

Heredity, however, includes the totality of impulses imparted to the individual from the whole ancestral line, from the primordial cell up through the whole line of the development of the race. The strongest influences, of course, come from the immediate progenitors, and the impulses from the lower forms of life are very slight. But atavism does occur, and its origin at times may be traced very far back, even to lower forms of life, constituting reversion of type, or what may be termed racial atavism. When the influence of racial atavism is limited to morphological features, its influence is comparatively unimportant being wasted principally in the development of rudimentary organs, such, for instance as the branchial fistulæ occasionally seen in the neck. But when racial atavism takes the chemical line, a very different state of affairs results. Tissues and organs are formed with more or less of the functions characteristic of the type imi-

tated. But other organs do not follow this same type, hence there occurs a maladjustment of organs, with clashing of functions, a condition of affairs necessarily accompanied by disturbance of nutritive harmony. The most striking example of this condition is lithæmia, which, as Fothergill truly says, is reversion of type.

Lithæmia is notoriously productive of neuroses. It acts in several ways. First, its presence indicates a maladjustment of organs with clashing of functions ; second, it leads to peculiar forms of auto-intoxications ; third, it supplies in renal and vesical calculi stimuli for the reflex excitation of neuroses in susceptible individuals.

One more word, neuroses of a purely morphological type, such as Clouston's developmental ugliness, may be termed passive, while chemical neuroses are active.

It will be noticed that throughout this paper I have used the term neurosis to designate abnormal functional manifestations whether resulting from the action of abnormal nerve tissue, or abnormal tissue of any other kind. I believe this extension of the term to be desirable, although it may be preferable to restrict the term neurosis to its etymological signification, and adopt an entirely new term, such as histosis, for the generic condition here described.

I beg to offer the following conclusions:

1. Rachford's triad of etiological factors is sufficiently comprehensive to include all causes of neuroses, if the term anæmia be understood to mean malnutrition.

2. The neuroses are immediately excited or called into action by a wide variety of local conditions, which may be termed irritations, and which act reflexly.

3. The exciting irritations, while generally abnormal, are not necessarily so, and may be normal conditions for the average individual, and only abnormal relatively for the particular individual.

4. The hereditary element in the production of neuroses, is often important, and is operative through various channels.

5. Neuroses are always dependent upon abnormal chemical structure of tissues.

6. Abnormal chemical structure of tissues may result from:

- A. Heredity
  - Immediate
  - Remote — Reversion of type.
    - Improperly adjusted organs.
      - Auto-intoxications
      - Lithæmia, etc.
    - Clashing functions.
- B. Deficient Constructive Metamorphosis
  1. Defici'nt food supply
     - Starvation
       - Complete
       - Incomplete.
     - Interference with food progress.
  2. Abnormal trophic nerve influence.
  3. Direct toxic action long continued.
  4. Pathological conditions affecting the organism as a whole.
     - Constitutional dyscrasiæ
       - Syphilis
       - Scrofula, &c.
     - Infections.
     - Many intoxications.
- C. Increased retrograde metamorphosis.

AN EXPLANATION OF THE GREAT FREQUENCY OF RICKETS AMONG NEAPOLITAN CHILDREN IN AMERICAN CITIES.

BY IRVING M. SNOW, M.D.,

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All American physicians who are active in hospital or dispensary life have noticed the great frequency of rickets among Italian patients. A very large proportion of the children of this nationality present well-marked symptoms of rachitis. Indeed, the most severe cases of rachitic deformity seen in orthopedic practice are from Southern Italy. This peculiarity of Italian children is all the more interesting because the disease was, until recently, only occasionally seen in this country, and is still rare among Anglo-Americans. In the monotony of digestive and respiratory disorders of a children's clinic it is safe to predict that in nearly three-fourths of the Italian children the disorder for which they are brought will be associated with rickets, and that this is the only pathologic difference between them and the rest of the community.

The study of the process of acclimatization of the various nations of northern and southern Europe that enter into the composition of our cosmopolitan population is as yet incomplete. Nevertheless, it is certain that any race not inured to our bleak northern climate must not only change its dress and regimen of life, but undergo a kind of cellular transformation in order to be in harmony with its environments and to preserve a vigorous physique in the second and third generations. Adults may endure extreme heat or cold, and be transplanted either to the tropics or the Polar Seas without harm, but this is not true of the children of the first generation, who endure very badly any marked change in the air to which their ancestors have for centuries been accustomed. His-

tory records many instances of the physical decadence of northern people who have migrated to semi-tropical regions.

Rachitis must be regarded as a serious condition in a child, as a constitutional deterioration, localized in the skeleton, muscles, nervous and digestive systems. A rachitic child has a lessened resistance to all of the acute infectious diseases, especially those involving the respiratory tract. If rickets be increasingly prevalent among our city poor, and if it shows itself in its most serious phases in any one particular class or nationality, the fact is worthy of earnest scrutiny and investigation.

In the study of rachitis among Italian children in American cities, it is, of course, necessary to determine (1) the proportion ot rachitic children among Italians; and (2) the proportion of rachitic children among other nationalities. Lastly, if rachitis be most frequent among Italians, the various supposed causes of the disease should be analyzed, to discover what especial factor, as diet, climate or habit of life, is chiefly in operation to produce this constitutional dyscrasia.

The object of this article, after indicating the degree of the prevalence of rickets among the various races of our population, is to show that the true reason for the very frequent development of the disease in Italians is found in the fact that it is the effect of our cold, damp, northern climate upon the offspring of a race that has lived for many hundred years in the warm, dry, sunny air of Naples and of Sicily. It is the physical deterioration of a southern race in a northern climate. I hope to be able to prove that the usual causes of rickets—city life, improper feeding, acute or chronic digestive disorders, bad air, crowding in dwellings, uncleanliness, infectious disease—which produce rachitis in a moderate percentage of the children of the northern races, act with far greater frequency and virulence upon the first generation of Neapolitans born in America.

To ascertain the exact ratio of rachitic children among Italians and other nationalities, I shall present the statistics of my dispensary service for a year.

Total number of children under three years, 200; Italians, 108; other nationalities, 92. Of the Italians, 76, or 70 per cent., were rachitic. Of mixed nationalities, 11, or 12 per cent., were rachitic.

The parentage of the latter class was Scotch 1, American 1, Jewish 1, German 2, Irish 2, Polish 3, not noted 1. Nearly all of the children were born in this country, but were chiefly of foreign extraction. My diagnosis of rickets was made after a careful examination of each child, and was based on well-marked beading of the costo-chondral articulations, craniotabes, etc. Characteristic transverse constrictions of the thorax were invariably more pronounced among the Italians—all of the cases of craniotabes and genu valgum or varum were among them. Whole families of children, as seen in successive years, were affected, so that rachitis was not only more frequent, but also more severe among Italians.

Of the seventy-six rachitic Italian children all had the classic rosary, and most of them were fat; many of them showed extreme muscular weakness, and were late in holding themselves erect and in walking; eighteen had transverse constriction of the thorax, with extreme narrowing and deformity of the chest; four had craniotabes, one with hydrocephalus; six had genu valgum; eight extreme muscular weakness; three enlarged spleen; two enlarged liver.

I was unable to discover that rickets in the Italians had any effect in delaying dentition. Most of the Neapolitan babies developed their teeth early, and without disturbance.

Eleven children, not Italian, all had the rachitic rosary; two had transverse constriction of the thorax. There was no craniotabes or pronounced limb-deformity among them.

The proportion of rickets among children of other races, 12 per cent., is small, and is probably insignificant as compared with that found in the densely populated cities of the Atlantic coast. In Buffalo the tenement-

house class is relatively small; the houses are nearly all detached; and very little real destitution exists, even among recent emigrants.

Parry, in 1878, found 28 per cent. of all children brought to the Philadelphia Hospital to be rachitic; 20 per cent. of the children coming to autopsy in the New York Foundling Asylum showed rachitic changes in the bones.

Having demonstrated something of the prevalence of rickets in Buffalo, 70 per cent. of Italian and 12 per cent. of the children of other nationalities, we may next inquire more precisely into the antecedents, environments and mode of life of the Italians in their original home. Nearly all of the Italians in Buffalo emigrated from the country districts about Naples, the modern Italian province of Campania; a very few came from Sicily. None, to my knowledge, came from the cities of Naples or Palermo, and none from Central or Northern Italy. It is, therefore, understood that the Italians alluded to in the paper are Neapolitans. Further, the Neapolitans differ as widely from the Tuscans or Piedmontese in temperament, mode of life, and in climatic surroundings as do the citizens of Boston, Mass., from those of Charleston, S. C. The climate of Turin, in Piedmont, is sub-Alpine, and in the winter months is colder than that of Copenhagen.

We may now raise the question as to whether the frequency of rickets in Neapolitans is not merely a racial peculiarity, a phase of the southern Italian constitution in infancy. Upon this point I shall quote from Hirsch's *Historical Geographical Pathology*. In this work it is declared "that rickets exists everywhere, although most common in Europe and North America, in the temperate zone; that a cold, damp climate, subject to frequent changes, is favorable for its development, as is shown by its existence in endemic form in England, Holland, France, Germany, Austria, and Northern Italy."

Rickets is extremely rare, except in a few great cities, in Southern Italy, Spain, Greece, Egypt, Syria, and among the half-starved vegetarian people of Hindo-

stan, China, and Japan. Rachitis is rare at high altitudes and in the extreme north, and is found in endemic form in large cities. Its absence in tropical and semi-tropical regions is contrasted with the great infant morality from all kinds of diarrheal diseases in these climates. Hence, as rickets is rare in the districts of southern Italy, whence my patients are drawn, and is present in 70 per cent. of the first generation of Neapolitans born in this country, being nearly six times as frequent among them as among Anglo-Americans, Irish, Germans, Poles, and Canadians, some especial cause must exist to produce this grave deterioration in physique and to intensify the so-called blood-irritant or other cause of the disease. I shall enumerate the various factors that may play a rôle in the etiology of rachitis, to discover if the endemic character of the disease among Neapolitans in North American cities be the result of any one cause.

According to Cheadle, any injurious influence operating in not too sudden a manner on an infant may produce rachitis. The Italian colony in Buffalo (including between 4000 and 5000 persons) lives near the harbor, on damp ground, in old two-storied and three-storied tenement-houses and frame cottages abandoned by the Irish. Nevertheless, the population in this neighborhood does not exceed 100 to the acre, as in the vicinity there are large open spaces, wide streets and railroad-yards. The parents are strong, healthy, young people. The women are well-shaped and have easy labors. I can find no ground for believing that there is any hereditary weakness of constitution or tendency to rachitis. All of the adults appear well nourished. The fare includes soups, meat, bread, cheese, and vegetables, and is as plentiful, if not as expensive, as the food of the average American laborer.

Crowding in dwellings is more common among the Italians than among the rest of the community. A family of five or six usually occupies two rooms, the cooking and eating being done in one room and the other

being used for sleeping. It goes without saying that from our standard of living their dwellings are dirty overcrowded, and poorly ventilated.

The babies of the family are housed for a large part of the year in cold or rainy weather, and must continually breathe a polluted atmosphere, a circumstance that undoubtedly would depress an infant's health. This point will be discussed later in connection with climate. If overcrowding in sleeping-rooms and lack of fresh air were the sole cause of rachitis, it would be nearly universal among all recent emigrants from Ireland, Poland, and among the lower class of Hebrews, as well as among Neapolitans.

Most of the Italians say that they are better fed and clothed in America, and that their sleeping-rooms are not as crowded as the small, smoke-filled hovels inhabited by the laboring-class in Naples, and are better ventilated.

Concerning the hygiene of the skin, the Italian babies were never as clean or as well cared for as the average American, Irish, or German. However, to say that they were, as a class, filthy would be untrue. They were warmly clad in winter, being usually swathed in a long, thick roll of woollen cloth.

Artificial diet, the feeding of infants with cows' milk, condensed milk, starchy or dextrin food, with an excess of carbo-hydrates and a deficiency in fats, has been rightly held to be a frequent cause of rickets ; yet most of the Italian children received the ideal infant food, breast-milk.

Analysis of food of Italian children under one year. Total number, 59.

Rachitic, 36: suckled, 21; suckled and fed, 8; artificially fed, 7. Not rachitic, 23: suckled, 17; artificially fed, 6.

Prolonged nursing cannot properly be held to be a cause of rickets, as in Japan, where children are suckled for two or three years, rickets is scarcely ever seen. A small proportion of the Italian women nursed their children for from fifteen to eighteen months. It was

common to see rickets in children whose digestion was apparently good and who received no other food than breast-milk. Nearly all of the artificially-fed babies received some breast-milk up to the age of twelve months, the milk being supplemented by soups, condensed or cow's milk or gruel. The quality of the breast-milk of the Italian women may be qnestioned, as it was not analyzed; yet the evidences of poor milk, deficiency in fats, and excess of albuminoids, were not shown by any usual symptom, stationary or diminishing weight, or habitual vomiting. On the whole, the rules of a proper infant-dietary were no more frequently violated among the Italians than among other races; indeed, the Italian babies were more frequently breast-fed than the remainder of the dispensary patients.

Influence of Intercurrent Diseases.—As a child is seldom brought to a medical clinic for rickets itself, I will state the various conditions for which the Italian children were treated. Total, 76.

1 pneumonia; 21 diarrhea; 5 dyspepsia; 3 meningitis; 9 bronchitis; 12 whooping-cough; 1 congenital heart-disease; 3 tonsilitis; 1 typhoid fever; 1 hydrocephalus; 1 Pott's disease; 2 syphilis; 6 extreme muscular weakness; 2 otorrhea; 1 eye-trouble; 1 injured spine; 4 not recorded; 1 cerebral monoplegia; 1 limb-deformity.

Pulmonary diseases, bronchitis and broncho-pneumonia, complicating measles and whooping-cough, as seen in the dwellings of the Italians, were frequent and fatal among them; yet the large mortality from respiratory diseases among these children might properly be regarded as due to the weak respiratory muscles and the soft ribs of rachitis.

Digestive disorders, chronic vomiting, and acute or chronic diarrhea were no more severe or more frequent among Italians than among other patients. It is nevertheless true that any digestive trouble is more prolonged in a rachitic baby and yields less readily to treatment than in a previously healthy child. I was unable to observe that the digestive disorders of these rachitic babies

were other than intercurrent affections. The rachitic children were usually brought for some acute malady of a few days' or weeks' duration, and it was evident that the constitutional disease had developed slowly and without marked symptoms.

When all these causes of rachitis are reviewed it is certain that enough are in operation to produce the disease in a moderate proportion of Italian children as well as in those of other nationalities. The conditions are insufficient to account for the fact that rachitis is nearly six times as prevalent in Italians as in other classes of the community, and is present in 70 per cent. of a race with whom the disease is rare in the mother country.

I have not yet discussed the influence of climate in the etiology of rachitis, and this Theobald Palm regards as the chief cause. Virtually all of my patients were born and lived in the same climate. The disease is rarest among Anglo-Americans who have lived in the country for generations. It prevails to a moderate extent among the children of English, Irish, Germans, and Poles. These races are inured to the cold, changeable atmosphere of Northern Europe. It is far different, however, with the Southern Italian, who has lived for many centuries under the clear skies and in the warm sunshine of Naples and Sicily. In these fortunate regions men, women, children, and babies are out of doors most of the year.

Besides the differences in climate between Buffalo and Naples, which are very great, the Italian babies in our American cities are housed for a large portion of the year on account of inclement weather, and breathe damp, foul air, which is always too cold or too hot. If there be any law of heredity, a race whose vitality and nutrition are accustomed to a semi-tropical climate and pure warm air cannot thrive amid such surroundings. The change is too sudden and acute, both in temperature and in atmosphere.

What are the differences in climate between Naples and Buffalo ? I have constructed a chart indicating, in

rather a schematic way, the temperatures and rainfall of the two cities, whose climate is a fair index for the surrounding districts.

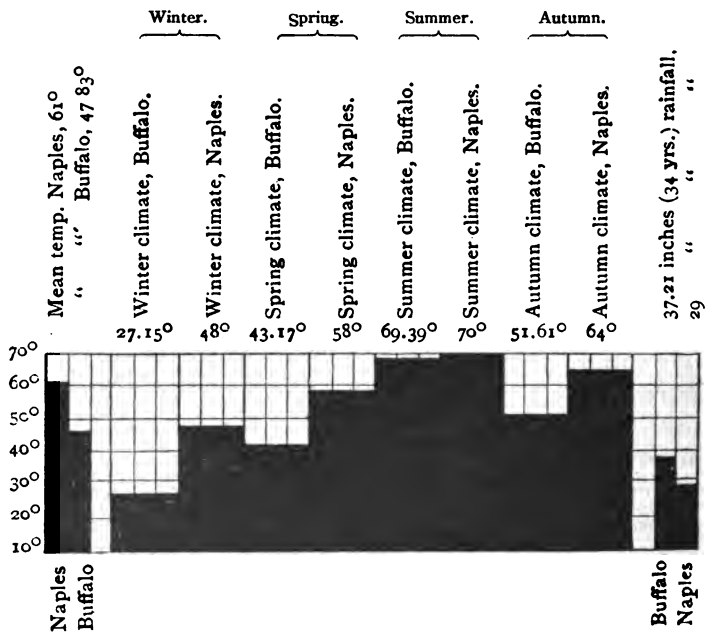
CLIMATOLOGY OF NAPLES AND BUFFALO CONTRASTED,

Naples: Dry and warm in winter; mild, with occasional rainy days in November and latter part of January and in February. Summer atmosphere tempered by sea-breezes.

Buffalo : Climate tonic and bracing; changeable and uncertain at all times.

	Rainy.	Cloudy.	Fine.
Naples	100	120	145 days.
Buffalo	289		76 "

Temperature—(of Buffalo, average 18 years ; of Naples, 20 years) :



The situation of Buffalo, in 42° 53' northern latitude, on Lake Erie, exposes it to bleak winds in the autumn, winter, and spring; the annual rainfall is 37.21 inches, 8.21 inches greater than that of Naples, which is situated in 40° 52' northern latitude. In Buffalo variations in temperature are very great and very sudden. The mean temperature for a year in Naples is 61°; in Buffalo 47.83°— that is, 13.17° lower than in the Italian city. The winter temperature of Naples is 48°, that of Buffalo 27.15° ; the American city is thus 21.85° colder. The mean temperature in

spring in Naples is 58°, in Buffalo 43.17°°; Buffalo has the colder temperature by 14.83°. In summer, curiously enough, the mean temperature of both cities is nearly the same, about 70°. The autumnal difference is 12.39°, Naples having a mean temperature of 64°, Buffalo, 51.61°, Between the winter and summer climate of Naples the variation of temperature is 22°, of Buffalo 42.24°. Again, Buffalo has only 76 clear days in a year compared with Naples, which has 145.

The intrusion of a southern race into a northern climate is an occurrence that has few parallels in history. It is reasonable to suppose that serious changes in physique seen in the first generation would follow a change of residence from an out-of-door life in a semi-tropical country to the gloomy skies and long winters of the North Atlantic and lake cities. In proof, I may point to the rapid deterioration of negroes in cold climates, or to the physical decay of the Anglo-Saxon race in India or in the hot climate of North and South America.

Whatever may be the disadvantages of life in warm climates, whether of crowding in dwellings, bad drainage, water, and food, it is certain that rickets is seldom developed among the natives of Southern Italy, Egypt, and India. The probability is that the misery, ignorance, and neglect of hygiene amid which the children are reared are in some degree offset by the bright, warm sunshine. To secure a perfect development of the young of the human species a large portion of the day should be spent out of doors, and, if possible, in the sun. This cannot be accomplished with the children of the city poor, and it is to this lack of pure air and sunlight that we may attribute the spread of rickets in densely populated urban communities. With the first generation of Neapolitans born in American cities, all of the causes of rickets—improper food, bad air, depression caused by infantile maladies—are intensified and accentuated, and the presence of rachitis in seven-tenths of the Neapolitan

babies in Buffalo indicates a constitutional deterioration from a great and sudden change in environment.

In plants and animals, adaptation to a different climate is never effected suddenly—a number of healthy adult individuals are first transplanted to some intermediate station, where they may grow several years. Some of the stock may develop vigorously, some deteriorate. As soon as the stock has been exposed to all the vicissitudes of climate the healthiest individuals may again be moved farther north, the necessary nursery and protection being of course given. Man has certainly greater powers of adaptation to climatic changes than animals or plants; still the history of the early years of a migration to a different climate, conducted even under the hygienic laws of a high civilization, is usually one of suffering and great infant-mortality.

The Teutonic races have always fared best when they have found a climate like that of their original home. Man is best able to maintain his health and multiply when he travels in isothermic lines. Migration either to a warmer or to a colder climate should be conducted slowly, step by step, allowing one or two generations to intervene before the extreme is reached.

In conclusion, I shall quote from Theobald Palm's excellent article in the *Practitioner* on the "Etiology of Rickets." He says: "The effect of light upon the human organism is obviously more complex than its direct chemical action upon the tissue immediately exposed to it. The exhilaration which we experience in bright weather, and the depression caused by dull, gray skies, must have a corresponding physical change in the nutrition or molecular condition of our nervous centers, and these react upon the general nutrition. The continuous withdrawal of a due measure of this normal stimulus to healthy functional activity must produce upon a young, actively-growing organism serious and far-reaching results." He also states that as light is essential to the well-being of the growing organism, the exclusion of light is a condition of development of the same organ-

ism in the embryonic stage. He suggests that the deficiency of light and sun after the embryonic stage is past, when nutrition is dependent on chemic changes of light and air, lead in plant and animal to partial continuance of the embryonic state, as seen in man and higher animals, in rickets in the continued growth of embryonic cartilage instead of its conversion into bone.

DISCUSSION ON RICKETS.

Dr. J. P. Crozer Griffith, of Philadelphia, said that the cause of this disease was certainly not fully understood. He had seen a great deal of rickets, yet he could not see that there was any difference in the etiology of his colored and white cases. The colored children who had come under his observation had been just as well cared for and fed as the white children, and it had been a puzzle to him why they should be more rickety than the white. The milk on which they were fed was the same as in the case of the white, *i.e.* cow's milk, for it was, of course, the artificially fed babies who were chiefly the subjects of the disease. It might be, as Dr. Snow had suggested, the transportation of a southern race to a northern climate, and yet it would seem that the colored children in Philadelphia ought to have become acclimatized by this time, so that this did not thoroughly explain it. Nor could he see how it could be explained by the difference in diet or care. The colored children whom he had seen, had usually been well developed, and yet they had been rickety. Indeed, the parents of these children had been better fed and dressed than the white people. It looked to him as though there might be a race peculiarity, apart from any influence of climate.

Dr. Holt said that the most severe cases of rickets coming under observation, at least in New York City, were either among the colored or the Italian children. He was unable to say from the records of his dispensary service how large the proportion was, but it was seldom that either an Italian or a colored child came to the hospital for any serious disease, that it was not found to be rickety, and usually in a marked form. He thought rickets was a vice of nutrition, and one of great complexity. The causes were many and far-reaching, and he was not sure that the primary cause was always the same; although the final cause seemed always to be an absence of or a failure to assimilate certain aliments in the food. The predisposition of the two races seemed unquestioned. He had been led to about the same conclusions as those Dr.

Snow had expressed in his paper. But there were cases which could not be explained by change from a southern to a northern climate. From a slight cause an Italian child would become rickety, while the same cause operating on an American child would have no such result. It was very singular that a disease having such a definite pathological condition should be so obscure in its etiology. In his experience, cranio-tabes had been very rare, and he questioned whether the cases of cranio-tabes were all rickety.

Dr. Fruitnight said that in his experience the largest number of cases of rickets had occurred among the Italians. Among the French there were very few. The next largest number was among the Teutonic race, including the English and Scandinavians; then the Slavonic races came next in order of frequency, more occurring among the Bohemians than among the Russians; last the Celtic race. He had not seen rickets among the Scotch, and it was very infrequent among the Irish. Thus it seemed that the inhabitants of continental Europe were more prone to the disease than the inhabitants of the British Islands. He thought this was due to the sudden transition from the environing conditions under which their ancestors had lived for centuries.

In regard to the relations of tuberculosis and syphilis, Dr. Fruitnight said that he thought that in most of the cases, one or the other of these diatheses was very apt to be present.

He would add a case to the list of congenital cases given by Dr. Townsend— a case shown by Dr. Dessau, of New York. This would make four cases now reported in this country.

Dr. Griffith, replying to a question asked by Dr. Seibert, as to whether cranio-tabes was rare in colored children, said that in his experience cranio-tabes was very rare in any children in this country. He had seen it very frequently in Vienna. He was inclined to agree with those who viewed it as a symptom of congenital syphilis rather than of rickets.

Dr. Seibert said that his experience did not agree with Dr. Griffith's. It would sometimes take two or three minutes to find the soft part in the head, and so it was easily overlooked. Michael Cohn (*Die Patholgie d. Rhachitis, Yahrb. f. Kinderheilk.*, January, 1894) had called special attention to this, and since then Dr. Seibert had been astonished to find so many cases of mild cranio-tabes. The spot was sometimes no larger than a five cent piece. It appeared

to be one of the first symptoms in many cases of rickets. Since his attention had been called to it, he had found cranio-tabes in by far the majority of cases of rickets. It should be looked for especially if there were any history of eclampsia.

Dr. S. S. Adams said that he had had no practical experience with congenital rickets. In Washington, rickets was such an infrequent disease among white children that it might be considered a thing of the past, so far as clinical record was concerned. This might be accounted for by the fact that the proportion of the white poor was exceedingly small in that city as compared with other cities. As to the etiology of the disease in the colored race, he agreed with Dr. Acker that it was due to improper feeding—more to this than to any congenital condition. The food was either not nutritious, or was of such coarse nature that the child could not assimilate it. The negroes must be educated to properly feed their children, and one of the best ways of teaching the parents was through their children in the public schools. By a system of lectures, like those given by the Sanitary League of Washington, the girls in the seventh and eighth grades would be instructed as to the best methods of feeding children.

Another difficulty was that the physicians did not take sufficient pains to instruct the parents concerning the proper feeding of infants. We must educate the mothers and find a food that is economical and safe. In that way we could eradicate the disease from the whites, and to a slight degree diminish it among the negroes.

Dr. H. Koplik said in regard to rickets in European countries that there was a large number of cases in which the etiology was congenital. The frequency of congenital rickets was especially noticeable in Austria, and more especially in children in foundling asylums. Cranio-tabes was not common, but the rosary of the ribs, and the enlargement of the ends of the long bones were certainly quite common in the newly-born, at least in the foundling asylum at Prague. In this country, he had found mild congenital rickets among the foreign population, or one generation removed. But children of American stock on both sides, their ancestors having been in America for two or three generations, were not commonly rickety.

Dr. F. M. Crandall said that he had begun a study of rickets a year or two ago, and had not yet completed it. So far, his conclusions were similar to those of Dr. Snow. There was a large number of cases among the Italians, and a comparatively smaller number among the negroes. In the Italian quarter he had found many cases which had

been nursed by the mothers, with a little artificial food, where there had been no apparent cause for the rickets. They had lived in a very poor way, but yet not materially worse than people in other regions where rickets was uncommon, and the children had been better cared for than those of many other races. The Italian women were good mothers. Environment alone would not account for the frequency of rickets among Italians. There must be some race predisposition besides the transportation to a different climate.

Dr. Stowell cited a case of twins, of Irish parentage, one of whom was large and robust, and the other markedly rickety. It seemed that the large child had gotten most of the mother's milk, and the smaller one had received in consequence an insufficient supply. The deficiency was made up with condensed milk.

Dr. Northrup said that a large number of the nurses who received children from the New York Foundling Asylum were Italian women, and their babies throve and got fat, so that it had become a sort of tradition in the hospital, that if a baby were to be saved, it must be given to an Italian.

Dr. Seibert asked Dr. Fruitnight on what he based his statistics. Did he compare the number of cases per thousand patients, or did he mean simply that because he saw many patients among Italians he saw many cases of rickets among them? On the east side of New York City, nine-tenths of the cases of cranio-tabes were made up of Italians and Russian Hebrews. Fifteen years ago it was the rarest thing in the world to see a well marked cases of rickets. At that time, a laboring man in New York City ate much more meat and nourishing food than now, and hence it was no wonder that rickets had increased. The speaker concluded that improper diet was chiefly responsible for the production of rickets.

Dr. Fruitnight said that he had examined every child coming to him as to rickets, and had found from the whole number the order of racial frequency mentioned above.

Dr. Holt asked how much good had come from drugs, particularly phosphorus in the treatment of rickets. He said his results with phosphorus had been absolutely *nil.* It seemed that it was chiefly a question of diet, and that drugs did not have much influence. He would like to know if other members had had ac orrespondingly discouraging experience with phosphorus.

Dr. Koplik said that the phosphorus must be nascent. He thought the best formula was that of Kassowitz. It was important that the phosphorus should be given in cod

liver oil. Following out this method of treatment he had had some encouragement in the treatment of rickets. Under this treatment, a child, say of two years, previously unable to stand, would improve in a short time so that it would be able to stand. The preparations of phosphorus such as Thompson's Solution and the elixir were undesirable, they are unstable preparations and he had lately endeavored to put the phosphorus in the form of nascent phosphorus by dissolving it in sweet almond oil in a capsule, finally breaking up the capsule in the requisite quantity of cod liver oil. The phosphorus in Kassowitz's formula would keep for some time. Giving phosphorus regardless of the form in which it was administered, was not doing justice to the one who introduced the treatment.

Dr. Seibert said that he had given phosphorus according to Kassowitz's prescription, one-sixth of a grain of phosphorus in three and a half ounces of cod liver oil, giving one teaspoonful of this mixture once in every twenty-four hours. It had not been retained by the stomachs of one-half of the children. He thought that phosphorus was a good thing, if given as a food, and along with other food.

As to salt-water bathing in the treatment of rickets, he said that if a baby needed salt, the best way to administer it was by adding the salt to the foot. In salt-water bathing the salt was not absorbed.

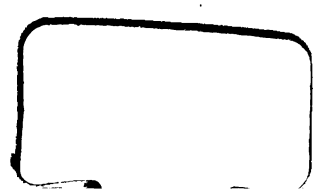
Dr. Koplik remarked that Kassowitz, as the result of his investigations, had claimed that it was not the cod liver oil, but the phosphorus which cured the rickets. The cod liver oil is simply a very digestible menstrum for the phosphorus.

Dr. Carr said that the general dietetic and hygienic management of rickets was usually all sufficient without resort to drugs. Thus if the Italian or colored children were properly clothed and fed there would be little occasion for medicinal treatment. The change from the warm climate of Italy to our own colder climate naturally affected the circulation in the skin and mucous membranes, and so predisposed these people to catarrhal troubles. Where the intestine shared in this catarrhal condition, the coating of mucus prevented absorption of the fat, either when taken in the form of food or as medicine. It was evident, therefore, that the problem was not solved by simply administering fat; it was the assimilation of the fat that was at fault. Undoubtedly a deficiency of fat was the primary cause of rickets, but it should not be forgotten that albuminous food was also necessary to the maintenance of the proper standard of health. Thus, he had

seen recently a child who had been fed on cream mixture up to the age of nine months, and who presented an extreme degree of muscular weakness as the only evidence of rickets. The administration of beef-juice and the addition of milk to the cream mixture soon brought about a satisfactory change in its condition.

Dr. Acker said that he believed if the negroes were placed amid more favorable surroundings, rickets could be easily cured without any drug treatment. Medicines, however, aided in restoring them to health, and in the Children's Hospital in Washington much benefit had been derived in such cases from the administration of the phosphatic emulsion, make according to a formula devised twenty years ago by Dr. S. C. Busey. It consisted of cod liver oil combined with yolks of eggs, New England rum, dilute phosphoric acid, glycerine, and flavored with oil of bitter almonds and orange water.

Although he had made a study of climate in relation to the etiology of the disease, he had been unable to come to any definite conclusion in regard to it. The negroes in the extreme southern states were just as rickety as those in the New England states. The thorax in the negro was usually narrower than in the white, and this, by interfering with the oxygenation of the blood, might favor the production of rickets. The negro was sensitive to cold air, and was in the habit of covering up his head when sleeping. They differed from the whites anatomically, in the size of the muscles, bones, etc., and also pathologically in their greater susceptibility to certain diseases.

Dr. Snow said that rickets was rarest among vegetarian people as in India and China. Its infrequency in tropical and semi-tropical countries is strangely in contrast with the great infantile mortality from gastro-enteric diseases in these regions. He could not agree with one of the speakers who claimed that the greater prevalence of rickets at the present time was due to the poorer condition of the laboring classes. The condition of the working people, at least, in the City of Buffalo was improving instead of deteriorating. In conclusion, he would say that he was of the opinion that the reason that rickets was five or six times as frequent among the Italians as among other races in the United States was to be found in the great and sudden change in the climatic conditions. He believed that the cure of this very complex condition a proper diet having been secured was to be effected chiefly by keeping those affected with rickets for the most part out of doors in a warm atmosphere. The disease has a strong tendency to spontaneous cure.

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